

RUNNING ON EMPTY: CAN CURRENT WATER REFORMS
SECURE AUSTRALIA'S WATER FUTURE?

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Statement of authorship

Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis submitted for the award of any other degree.

This thesis has not been submitted for the award of any degree or diploma in any tertiary institution.

Signed: 

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Abstract

The following thesis explores a critical public policy issue for Australia: securing our water future. It traces the historical roots of water policy in Australia to illustrate the natural and political economy drivers that have shaped the development, management and use of water resources, highlighting the economic and environmental legacy issues created by these past decisions. It considers the Commonwealth and states' response to these problems through the development of the National Water Initiative (NWI). It provides an assessment of the implementation of NWI reforms, drawing in part upon published primary and secondary sources, but owing to the lack of other available assessments or documented evidence, more often upon unpublished primary material accessed through the author's work at the National Water Commission. The latter sources have yet to be drawn upon by other academics.

The thesis argues that the water reforms embedded in the NWI provide an adequate framework for achieving Australia's future water security. However, the thesis also highlights a number of problems with the implementation of these reforms, including the failure of Australian governments to satisfactorily link water reform to climate change and to adequately communicate a shared Commonwealth and states' vision for water reform. In particular, the failure to deal adequately with overallocation and adjustment is identified as the most significant obstacle to reform. Strategies for improving water reform implementation are outlined. The analysis focuses on the reallocation process and how it could be accelerated by communicating clear targets for reallocation to the environment, coordinating buyback with appropriate reconfiguration and targeted adjustment assistance to help communities manage change. The thesis also argues that policy settings need to support efficient water markets as the best way to allocate remaining water between consumptive users and to provide signals for viable investment in water supply infrastructure. A significant increase in effort in these areas is urged to ensure Australia achieves what has so far eluded it: a secure water future.

List of Abbreviations

ABARE	Australian Bureau of Agricultural and Resource Economics
ACCC	Australian Competition and Consumer Commission
ACT	Australian Capital Territory
CMA	Catchment Management Authority
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEWHA	Department of Environment Heritage and the Arts
ESD	Ecologically Sustainable Development
ECRP	Exceptional Circumstances Relief Payment
GAP	National Groundwater Action Plan
GDE	Groundwater Dependent Ecosystem
HCV	High Conservation Value
HCVAE	High Conservation Value Aquatic Ecosystems
IPCC	Intergovernmental Panel on Climate Change
IGA	Intergovernmental Agreement
IUWCM	Integrated Urban Water Cycle Management
NCP	National Competition Policy
MDB	Murray-Darling Basin
MDBA	Murray Darling Basin Authority
NFF	National Farmers' Federation
NMI	National Measurement Institute
NRM	Natural Resource Management
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
NT	Northern Territory

NWC	National Water Commission or “the Commission”
NWI	National Water Initiative
NWIC	National Water Initiative Committee
PC	Productivity Commission
QLD	Queensland
QWC	Queensland Water Commission
RNWS	Raising National Water Standards Program
SA	South Australia
WA	Western Australia
WADCO	Water Accounting Development Office
WADC	Water Accounting Development Committee
WAPs	Water Allocation Plans
WAR	Water Allocations Register
WELS	Water Efficiency Labelling and Standards Scheme
WMP	Water Management Plan
WRF	Water Reform Framework
WRP	Water Resource Plan
WSAA	Water Services Association of Australia
WSC	Water Sensitive Cities
WSP	Water Sharing Plan
WSUD	Water Sensitive Urban Design

Glossary of terms

Consumptive pool means the amount of water resource that can be made available for *consumptive use* in a given water system under the rules of the relevant water plan (the same meaning as defined in Schedule B(i) of the NWI).

Consumptive use means use of water for private benefit consumptive purposes including irrigation, industry, urban and stock and domestic use (the same meaning as defined in Schedule B(i) of the NWI).

Environmentally sustainable level of extraction means the level of water extraction from a particular system which, if exceeded, would compromise key environmental assets or ecosystem functions and the productive base of the resource (the same meaning as defined in Schedule B(i) of the NWI).

Irrigation infrastructure operator means a person who owns or operates infrastructure for the storage; delivery; or drainage of water (water service infrastructure) for the purpose of providing a service to another person and the operator operates that infrastructure for the purposes of delivering water for the primary purpose of being used for irrigation.

Irrigation district means an area or district that is supplied with water through an infrastructure supply network (channels, pipes and other structures) operated and maintained primarily to supply water for use within that district.

Irrigator means a person who receives water delivery services from an irrigation infrastructure operator.

Overallocation refers to situations where, with full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the *environmentally sustainable level of extraction* for that system (the same meaning as defined in Schedule B(i) of the NWI).

Overuse refers to situations where the total volume of water actually extracted for consumptive use in a particular system at a given time exceeds the *environmentally sustainable level of extraction* for that system. Overuse may arise in systems that are overallocated, or it may arise in systems where the planned allocation is exceeded due to inadequate monitoring and accounting (the same meaning as defined in Schedule B(i) of the NWI).

states includes both states and territories of the Commonwealth of Australia unless otherwise specified.

Termination fee means a fee levied by an operator when a delivery entitlement or delivery right is surrendered to the operator to terminate any rights or obligations associated with that delivery entitlement or delivery right (including any requirement to pay an access fee).

Water access entitlement means a perpetual or ongoing entitlement to exclusive access to a share of water from a specified *consumptive pool* as defined in the relevant *water plan* (the same meaning as defined in Schedule B(i) of the NWI).

Water allocation means the specific volume of water allocated to water access entitlements in a given season, defined according to rules established in the relevant water plan (the same meaning as defined in Schedule B(i) of the NWI).

Water plan means statutory plans for surface and/or ground *water systems*, consistent with the *Regional Natural Resource Management Plans*, developed in consultation with all relevant stakeholders on the basis of best scientific and socio-economic assessment, to provide secure ecological outcomes and resource security for users (the same meaning as defined in Schedule B(i) of the NWI).

Water system means a system that is hydrologically connected and described at the level desired for management purposes (e.g. sub-catchment, catchment, basin or drainage division and/or groundwater management unit, sub-aquifer, aquifer, groundwater basin) (the same meaning as defined in Schedule B(i) of the NWI).

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Chapter 1 Introduction

Australia is the driest inhabited continent, challenged by scarce and variable water supplies. It is not surprising then that ensuring a secure, efficient and sustainable water supply for competing demands is one of the country's most significant public policy concerns. This basic objective has been pursued in various forms by successive Australian governments over the last two hundred years. For the most part, this has occurred through public investment in water storage and supply infrastructure to improve water security and, in the more recent past, by the introduction of a water reform agenda aimed at amending past practices and leading to more efficient and sustainable water allocation and use. However, despite having developed one of the world's most sophisticated water policy and management frameworks, Australia still finds itself responding to crisis, as yet unable to demonstrate that it has achieved the primary goal of ensuring a secure, efficient and sustainable water supply.

From Deakin to Rudd, a litany of government plans and initiatives plot the course of Australian water policy and management. In 2004, in the face of increasing water scarcity and mounting evidence of climate change, the Commonwealth and state and territory governments committed to the current water reform agenda through the intergovernmental agreement on a National Water Initiative (NWI). The NWI sets the overarching framework for water reform in Australia. Its principal goal is to increase the productivity and efficiency of rural and urban water use whilst ensuring community needs are met and river and groundwater systems are returned to environmentally sustainable levels of extraction (NWI Preamble, paragraph 5). An ambitious and largely comprehensive plan, the NWI significantly extends previous national reforms, including those in the 1994 Council of Australian Government (COAG) water reform program developed in the broader context of the National Competition Policy. Since 2004, subsequent policy developments such as the 2007 National Plan for Water and the 2008 Water for the Future package have aimed to reinforce and accelerate NWI reforms.

To date, NWI outcomes have been variable. Water markets have expanded and water planning has generally improved, but there is little hard evidence pointing to improved efficiency or productivity and even less which suggests that river and groundwater systems have been returned to environmentally sustainable levels of extraction. Australian water policy and management is still far from overcoming the challenges of protracted drought, increased demand from agriculture and growing urban populations, and environmental decline. Climate change is also expected to significantly increase these pressures. Recent Intergovernmental Panel on Climate Change (IPCC, 2007) and Commonwealth Scientific and Research Organisation (CSIRO, 2008) projections indicate a significant increase in the variability and scarcity of water supply. The following work assesses the adequacy of the present water policy and management framework for responding to these mounting and complex pressures facing Australia. The analysis and evaluation in this work also establishes a number of recommendations for how Australia can better achieve the outcomes of national water reform.

1.1 Outline

This work begins by placing the development of water policy in Australia in an historical context. Chapter 2 examines the ideas and objectives that have historically underpinned Australia's approach to water management, and argues that these approaches have continued to wield a significant influence in shaping the current thinking on water management. It is shown here how water policy and management in Australia has been shaped not only by a variable climate and scarce water supplies, but has also been driven by broader economic, demographic and environmental aspirations. The legacy of these broader objectives, particularly Australia's commitment to ecologically sustainable development and economic efficiency through microeconomic reform, are shown to be key factors influencing Australia's contemporary water policy and management.

Chapter 3 presents Australia's contemporary approach to water policy and management, as embodied in the NWI reforms. The chapter details how the NWI, despite being a relatively recent initiative, carries the hallmarks of traditional water policy. At the same time, the analysis details how the NWI has ventured into new water policy territory, with its multiple elements responding to increasingly complex contemporary social and environmental pressures on Australia's water security and supply. Since the enactment of the NWI in 2004, successive federal governments have introduced further plans aimed at accelerating NWI implementation. In 2008, COAG agreed to a number of further policy developments. In this context, the outline of the NWI and recent policy developments provided in Chapter 3 establishes the current status of the initiative, and also plots the way the NWI has progressively and incrementally been altered to respond to emerging policy drivers.

The current and emerging policy drivers impacting water management are then isolated for assessment in Chapter 4. At the forefront of this analysis are the impacts of protracted drought, competing demands from urban and irrigation water users, and the declining environmental health of surface and groundwater systems. The chapter also considers the emerging impacts of climate change on water availability and implications for water policy and management. It is suggested here that climate change will serve to intensify the impacts of current policy drivers, underscoring the importance of ongoing reforms to ensure secure, efficient and sustainable water supplies. It is argued that the objectives of current water reform are theoretically sound and appropriate in terms of charting a response to these impacts. The major risk, however, is that the timing and magnitude of climate change makes addressing these impacts significantly more difficult and demands more rapid adjustment to water management and use than is projected under the current reform trajectory.

If the multiple elements of the current NWI framework are accepted as an appropriate response to current and emerging water challenges, and the slow pace of reforms is

recognised as a risk, it is important that the implementation of reform is timely and effective. The implementation of the current policy framework is considered in Chapter 5. Specifically, Chapter 5 assesses the implementation of the NWI to date, and outlines further action required in each of the major areas of reform. It is argued that progress in the implementation of the NWI is delivering real improvements in the understanding, management and use of water in Australia. However, the chapter also argues that there are still vital elements of the reform agenda where progress needs to be faster and more consistent; where a clear articulation of the outcomes expected from reforms is required; where better sequencing and coordination of elements of the reform agenda would improve implementation; and where policy coordination across government and between policy and programs (such as water, forest, regional development or drought policy) could be improved.

In this context, strategies for tackling the major challenges of overallocation and adjustment are examined in Chapter 6. Notwithstanding progress that has been made, it is argued here that the success or failure of the reform agenda depends primarily on addressing the major challenges of overallocation and adjustment. It is argued that addressing these challenges should involve improving policy coordination and government decision making to facilitate and expedite the significant reallocation of water as total water available declines, and continuing with reforms to equip water managers and users to handle future conditions and risk. Overall, it is recommended that reforms need to be implemented much faster to achieve the anticipated benefits.

Chapter 7 concludes by suggesting that the multiple elements of the current framework are appropriate for responding to current and emerging policy drivers, including increased scarcity and variability owing to climate change. In particular, improved water planning, entitlements to access water based on sustainable levels of extraction, water trading and improvements in water accounting and measurement should all contribute to the required improvement in adaptive capacity. It is argued that the actions underway as part of the NWI

are underpinned by fundamental and sound principles, but it is also argued that owing to the scale and timing of current and emerging challenges such as climate change, further actions and a significant acceleration in the implementation of reforms is necessary. The work concludes by making a number of high level recommendations on how to improve and accelerate the implementation of current reforms.

1.2 Methodology

Despite significant public and media interest in water in Australia over the last decade, there is limited existing analysis on the progress of contemporary reforms and the accompanying body of literature is relatively small. This may reflect the difficulty in critically evaluating such a rapidly evolving policy agenda, as well as the fact that until recently, water policy and management was not taught as a discrete discipline. Regardless, the body of literature that does exist is impressive, intellectually rigorous and growing (e.g. Dovers and Grafton, Connell, 2005; Hussey and Dovers, Pigram, Quiggin, Watson, 2006; Connell, Crase, Musgrave, 2007; Connell and Grafton, 2008). This previous work has informed the discussion and analysis presented here, particularly in regard to the factors influencing the development of water policy and management in Australia and subsequent legacy issues.

Given the paucity of previous critical investigation, lack of other available assessments or documented evidence, the review of the implementation of reforms presented in Chapter 5 draws primarily on the author's professional experience in policy implementation and the assessment of water reforms. As Senior Manager of Water Markets and Assessments in the National Water Commission (the Commission), the author was central to the preparation of the Commission's *2007 Biennial Assessment of Progress in the National Water Initiative* (2007 Biennial Assessment) and *2008 COAG Update Report of Progress in Water Reforms* (2008 Update Report), and is currently responsible for the *2009 Biennial Assessment of Progress in the National Water Initiative* (2009 Biennial Assessment). The analysis of the

implementation of the current policy framework presented here benefits from information submitted to the Commission by the parties to the NWI, including through the NWI implementation plans of each jurisdiction, progress reports submitted by the Commonwealth, state and territory governments to the Natural Resource Management Ministerial Council, and through extensive consultation and interaction with senior Commonwealth and state and territory government officials in the course of conducting Commission assessments of progress of water reforms. This work also draws on public submissions received by the Commission as part of the biennial assessment process, providing insight into the views of a range of irrigation, environment, urban, industry and research stakeholders. The views expressed by these stakeholders are supplemented by comments recorded by the author in meetings of the Commission's Stakeholder Reference Panel and during the Commission's 2009 Stakeholder Forum. This work also benefits from published and unpublished material on elements of the reform framework such as environmental water, water markets and water planning, commissioned as part of the Commission's Raising National Water Standards (RNWS) Program¹ (references are listed in the Bibliography, and cited throughout this work).

The Commission assessments of 2007 and early 2008 sought to assess progress against actions committed to in the NWI and to the achievement of the agreed objectives. This work extends these assessments, taking into consideration developments since their completion including the significantly improved understanding of the impacts of climate change on water availability and the development of a new COAG work program for water. Since the previous Commission assessments, the Commonwealth's funding of, and role in, water policy and management has significantly expanded, particularly in the Murray-Darling Basin.

Unpublished primary material such as reports prepared for the Commission and COAG accessed through the author's work at the National Water Commission allow these new

¹ This \$250 million program provides funds for projects and high priority activities to: advance the implementation of the National Water Initiative; improve integrated water management across Australia; and improve knowledge and understanding of Australia's water resources.

developments and emerging information to be incorporated in this applied policy analysis².

In addition to taking into account new knowledge and policy developments, this work significantly differs from and adds to the Commission's previous assessments by placing the multiple elements of the policy framework in a broader frame and assessing the adequacy of the overall reform agenda against the current and emerging drivers of water policy and management.

Limits on scope and space preclude detailed comparison with overseas experience in water management. However, as noted by Hussey and Dovers (2006) "the challenges inherent in water policy are not isolated to Australia and... it is useful to place our experiences in the context of international developments" (Hussey and Dovers, p. 141, 2006). Australia's current water reforms are consistent with a global trend in relation to the emergence of a new management paradigm for water in response to specific water challenges arising in the latter part of the last century. The new management paradigm is consistent with the focus on environmental and social concerns as part of the international trend towards sustainable development (Essaw, 2008). As is the case in the European Union, Canada, South Africa and Brazil, adopting this new paradigm in Australia requires a change from previous bureaucratic and sectoral arrangements for water towards institutional arrangements which integrate all aspects of water management (Bauer, 2004; Easter 2004). While the drivers of change vary between these countries, reform in each is closely linked to addressing current and emerging challenges such as securing urban water supply and balancing demand from competing uses. Insight gained through this analysis of the Australian reform experience, therefore, may be relevant to other countries.

² A number of reports have been commissioned as input to recent Commission or COAG work – they are not confidential as they have been used as an input to broader policy and reporting, but in being unpublished at this time have yet to be drawn upon by other researchers. Reference to, and analysis of, these unpublished reports in this work, provides for a unique and in-depth insight into the data and ideas shaping current water policy in Australia.

The timeliness of this analysis is underscored by unprecedented low water availability in many parts of Australia, the generally accepted view on the scale of the challenges presented by climate change, and the significant resources governments around the country are directing at water reform. By highlighting where the implementation and coordination of water reforms could be improved, this work is contributing to the Commission's 2009 Biennial Assessment and, it is hoped, the achievement of a secure water future for Australia. In addition, given the scale of global water challenges and the broad acceptance of the new management paradigm for water, the following analysis is relevant to scholars and policy makers concerned with more equitable and efficient water resource management in a variety of international settings.

Chapter 2 The development of water management in Australia

Protracted drought, increasing demand from agriculture and population growth, and public concern for the environment are generally accepted as having been critical to shaping the development of water policy in Australia (Tisdell et al., 2002). A comprehensive understanding of Australian water management, however, also requires consideration of path dependencies and the evolution of governments' response to the above listed policy drivers (Cruse, 2007). This chapter places the various forces that have driven water policy in a social, political and historical context. It provides a broad historical overview that draws upon the analysis of established water policy scholars (see Connell, 2007; Randall, 1981; Watson, 2007). In drawing upon the scholarship in this field, the chapter selects and synthesises the important historical, legal and institutional influences on Australian water policy in order to determine the foundations of current reforms, and to highlight how past policy decisions have influenced contemporary responses to enduring issues.

As Burns et al. (2005) note, no water reform takes place on a blank slate; water management in Australia has evolved in line with the formation of state and ideological maturation of governments over time. This has included the establishment of a federation under which states retained rights to water, an extended phase of nation building and a focus on economic and demographic growth, prior to the more recent focus on economic efficiency and environmental sustainability. An understanding of the influence of these various economic, social and environmental aspirations on the evolution of water management in Australia provides the context for the detailed outline of current reforms in Chapter 4, and the critical assessment of the progress in implementing major transformations in institutional arrangements in Chapter 5.

2.1 A short history

Australia's limited water resources will have considerable influence on the country's growth and future development. The longer-term objectives of the Australian Water Resources Council include the definition of areas where water resources offer the greatest potential for population growth and areas where inadequate water resources may require the introduction of special measures to provide opportunities for development.

Australian Water Resources Council (AWRC), 1963, preface

Australia is the world's driest inhabited continent. Fifty percent of Australia receives an annual rainfall of less than 300 mm. As noted in the *Review of Australia's Water Resources 1963*³ referred to above "precipitation is unreliable and rivers have a wide range of discharge... the natural environment, predominately semi-arid, where droughts and floods are common, presents significant difficulties" (AWRC, 1963, p.2). Consequently, development in Australia is closely related to access to scarce and naturally variable water supplies, and the management of water is a significant feature of Australia's economic, political and social history.

The development of the colonies of Australia was driven by settler-initiated frontier expansions, a decentralised organisational model sustained by civic self-reliance and assurances of speedier implementation compared to the bureaucratic alternative (Powell, 2002). Expansion was supported by British common law, and with it the riparian doctrine which gave landholders rights to access and use water adjoining their land. The common law did not define the water itself as property; rights to water were attached to land and could not

³ This review, by the Australian Water Resources Council (AWRC), is the first official documentation of Australia's surface and groundwater resources. AWRC was established in late 1962 by agreement between the Commonwealth and all state governments, with the principle objective of providing "a comprehensive assessment on a continuing basis of Australia's water resources and the extension of measurement and research so that future planning can be carried out on a sound and scientific basis" (AWRC, 1963, preface). Subsequent national level reviews were produced in 1975, 1983 and 1996 (all noting deficiencies resulting from insufficient data).

be bought or sold separately to the land itself (Tan, 2007). In this way, the first phase of colonial settlement resulted in only the ad hoc and opportunistic development of water resources with pioneers largely responding to the availability of land and water (Pigram, 2006). The ambitions of private owners took precedence over any regional development objectives, and the pursuit of survival in the face of recurrent drought precluded any pioneering environmental consciousness.

With the mid-nineteenth century however, when the easy water resource development options had been exhausted, came the realisation that for permanent occupation of the interior, effective measures would be needed to control and share scarce water resources (Pigram, 2006). It was increasingly apparent that while adequate for early low density settlement and agriculture, common law principles were not suitable for the desired urban development, intensification of agriculture, or improvement of mining operations (Powell, 1976). The common law doctrine did not provide the secure water rights necessary to underpin investment in reticulated supply and waste disposal for Australia's growing urban areas, nor for increased and more reliable water supply required to support the intensification of dryland farming, irrigation and population under 'closer settlement'⁴.

Three years of drought leading up to 1881 focussed attention squarely on the inadequacy of prevailing water management (Smith, 1998). There emerged the widespread perception that ensuring the security of urban and rural water supplies was paramount to public health and economic development (Watson, 2006). Drought-proofing and the development of water storage and delivery systems were championed amid the prevailing ethos of agrarian-led national development. This was particularly evident in the establishment of irrigated agriculture, vigorously promoted by "governments wanting to establish an economic base for a society of independent small farmers which it was thought would provide a fertile

⁴ A term applied to the condition where government encouraged the purchase, subdivision and resettlement of large freehold estates and the opening-up of vast areas of Crown land for small-scale dryland farming and irrigation (Powell, 2002).

environment for democratic egalitarian values” (Connell, 2007, p.70). To this end the Victorian government established the Water Conservancy Board and charged it with investigating the feasibility of developing water supplies for the purposes of irrigation (Martin, 1955). The resulting reports were the first of their kind in Australia, however upon their respective release in 1881 and 1882, they concluded by advising that:

...too sanguine a view of its [irrigation's] profitableness are often entertained from an under-estimate of the cost and an over-estimate of the result, arising from a want of information and due consideration of the conditions essential for success.

Gordon and Black, 1882

As Davidson (1998, p. 133) suggests, while these remarks are “probably the most accurate portrayal of the economic consequences of irrigation ever made in the country”, they were dismissed however by Alfred Deakin, the then Victorian Minister of Water Supply. Similar to the manner in which South Australian Chief Secretary Blyth had called for a “doing away with Goyder’s absurd line of rainfall” less than a decade before, Deakin ignored Gordon and Black’s serious doubts about the wisdom of fostering the expansion of irrigated agriculture along the Murray River (South Australian Parliamentary Debates 5 November, 1874). Instead, Deakin relied on his observations made during his 1884 Royal Commission tour of the Western United States. Deakin’s subsequent report *Irrigation in Western America* emphasised the importance of irrigation and the role of the state in the development of water resources (Davidson, 1998; Connell, 2007).

Smith (1998, p.151) uses the phrase “climatic determinism” to describe the resulting political and institutional response, whereby more centralised, government-driven development of water resources supplanted the traditional doctrine of riparian rights. The *Victorian Irrigation Act 1886* is indicative of subsequent state government legislation which gave the state exclusive right to the use, flow and the control of water in any watercourse. Other Australian

states followed the Victorian model, with the result of these legislative changes being the almost exclusive provision of public water by government authorities, and the introduction of a system of centralised administrative allocation of water rights, managed by a public water authority (Paterson, 1987; Mulligan and Pigram, 1989; and Smith, 1998). Following heated debate over rights, access and use to shared water resources during the Australasian Federal Convention of 1897-98 (see Connell 2007, p.56-65) the constitution enshrined the rights of the sovereign states of the Commonwealth of Australia to manage their own water resources (Haisman, 2005) and each state developed largely autonomous administrations (Crase, 2007). In Victoria for example, the State Rivers and Water Supply Commission was introduced under the terms of the *Water Act 1905* to control water management and pursue closer settlement. Connell (2007) and Musgrave (2007) describe this first phase of irrigation development in detail but both note, in particular, the influence of Deakin and the Chaffey brothers, who were determined to replicate in northern Victoria the social and economic transformation they had witnessed in California.

To enable such water supply and irrigation projects, security of water supply was paramount and naturally high variability of water supply, coupled with high rates of potential evaporation, necessitated the construction of large storage reservoirs (AWRC, 1975). Smith (1998) observes that with the largest temporal variance in rainfall of any continent, dam storage capacities in Australia needed to be twice that of the world mean and six times that of Europe to achieve a similar level of supply security. State governments readily accepted responsibility to meet this challenge, becoming extensively involved in the water industry as financiers, developers and owners of supply infrastructure such as dams and urban and irrigation water supply schemes (Watson, 2006).

Through the second half of the twentieth century state governments, through their water authorities, continued to be preoccupied with the development and delivery of water and irrigation infrastructure. The bulk of water storage and distribution systems were developed

during this period and governments actively sought out people to use the water made available (Connell, 2007). This coincided with a time of generally favourable rainfall, where despite some significant floods and droughts, the security of supply was generally very high, and extractions were still at fairly moderate levels (Connell, 2007). A belief thus emerged among water managers and users that water resources could indeed be controlled in order make the country largely drought-proof⁵.

The primacy of national and agrarian development resulted in the development of water resources regardless of cost, and without an obligation to consider external impacts – an early example of rural policies escaping the general scrutiny that applies in areas such as education or health⁶. Until the 1970s governments commonly adopted the role of “resource development entrepreneur” (Connor and Dovers, 2004, p.89), and government projects to enable utilisation of water resources were a key part of regional development initiatives to promote economic and demographic growth (Watson, 1990; Rijsberman, 2006). Public irrigation schemes were established without careful appraisal of economic prospects taking into account the availability and cost of other factors of production, market opportunities and rainfall variability (Davidson, 1969). Consequent distortions in water use and the operations of water authorities resulted in the overallocation of water, extensive subsidisation of supply costs, severe environmental degradation, a lack of adequate signals or incentives to conserve water, and increased competition amongst water users (Greig, 1998; Mulligan and Pigram, 1990; Randall, 1981; Watson and Rose, 1980).

By the 1980s, these factors resulted in water resource development no longer enjoying the unquestioned endorsement it had for the preceding century (Quiggin, 2001). The cost of

⁵ Irrigation was seen as a means of ‘drought-proofing’ farms. It is interesting to note the more recent view which suggests “recent droughts have demonstrated that irrigators were just as vulnerable as dryland producers, and, in some ways, worse off because of the heavy losses involved in establishment costs for failed crops and the fixed costs associated with irrigation projects (Pigram p. 23, 2006).

⁶ For further discussion of the influence of agrarianism on policy in Australia see Botterill (2009) *The role of agrarian sentiment in Australian rural policy*, in Merlan and Raftery (eds) *Tracking Rural Change: Community, Policy and Technology in Australia, New Zealand and Europe*

operating and maintaining infrastructure was rising, as was pressure for replacement expenditure. In addition, the opportunity cost of capital for water resource development had risen to unprecedented levels as competition for funds between water and other public works intensified (Mulligan and Pigram, 1989). Closer settlement had led to irrigation blocks that were too small and unable to pay their way from the outset (Watson, 2007). Paterson (1987) estimated that only twelve percent of the land in irrigated production in 1987 would have been developed on strict economic criteria. Most significant, though, was that community attitudes to water were changing. In Australia and abroad, it was increasingly recognised that unfettered development combined with water scarcity was escalating conflict between rapidly growing urban areas, agriculture, and the environment (Graffy, 2006). Growing awareness of the severity of environmental degradation coalescing with concerns about the relative scarcity of water and the efficiency and equity of water allocation meant balancing consumptive and environmental water use became a feature of debates about water supply and management (Tisdell et al., 2002).

The emergence of these new public preferences and values challenged the wisdom of continued dam building and public subsidisation of water use (Randall, 1981; Watson and Rose, 1980). Conflict was growing between past development objectives and newer economic and environmental objectives. Economists and environmentalists argued against continuing with management strategies that, in directing the over-commitment and over-extraction of water, threatened the environmental and productive values of the resource (Randall, 1981; Watson and Rose, 1980; Greig, 1998). Recognition of the scale and interrelated nature of these challenges led to the perception of water as a scarce resource and urgent calls from industry, environmental, and consumer groups for reforming institutions and institutional arrangements for water (Bauer, 2004). Governments that had previously been at liberty to actively pursue the development of water resources were now under increasing pressure to address social, political, economic, technical, and environmental aspects of water

management. This was particularly the case in the Murray-Darling Basin where enthusiasm for water resource development had been most pronounced (Cruse, 2007).

In this way, the emergence of a new management paradigm for water in Australia and internationally⁷ was founded in the widespread belief that shifting towards a more comprehensive and integrated management-orientated approach would help address what had emerged as the twin focal points of water policy – ecological sustainability and economic efficiency. According to Watson (1990, p.13), there was a “fundamental shift away from an axiom of single resource development, to the systemic management of resources as an ecological, economic and social system”. The consensus in Australia and abroad that water policy under a management paradigm should expand the scope of water management to include these broad aspects was also a product of the dominant philosophy in natural resource management at the end of the last century, that is, sustainable development.

2.2 Sustainable development

The once unlikely union of environmental and economic concerns witnessed in the developing water debate of the late 1980s was symptomatic of a broader movement in development theory at the time. The publication in 1987 of *Our Common Future*, the report of the UN World Commission on Environment and Development (the ‘Brundtland Commission’) reflects the linking of environmental and resource concerns with those of economic management and scarcity (Dovers, 1997).

The Brundtland Commission signalled the need to integrate economic and ecological aspects of development to achieve sustainable development, which it defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p.43). The Commission is credited with bringing

⁷ See further, the *Journal of Contemporary Water Research and Education* (Hooper, 2006), which reviews international experiences in moving from fragmented to integrated water management.

environmental issues from the periphery into centre stage by demonstrating that future economic progress could not be sustained if there were continuing degradation of ecological systems (Harris and Throsby, 1997).

The concept of sustainability was the driving force behind the *Rio Declaration* and *Agenda 21*, agreed to at the UN Conference on Environment and Development (UNCED) in Rio in 1992. *Agenda 21* proposed integrated catchment management as the best way to take account of policy, community involvement, social justice and intergenerational equity issues and promote the development of robust and appropriate institutions (Connell and Dovers, 2006). As a signatory, Australia committed to develop guidelines for resource management to be adopted by governments and the respective agencies in their control (COAG, 1992a). In 1992, the Council of Australian Governments (COAG⁸) endorsed the National Strategy for Ecologically Sustainable Development (ESD)⁹. In line with WCED-UNCED recommendations, the National Strategy for ESD stood for and promoted ‘development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends’ (COAG, 1992b, p.1).

These developments were significant in shaping the COAG water reform agenda (COAG, 1992a; 1994). The institutional recognition of a broader suite of issues than those associated with past development approaches added a complicating dimension to the previously narrow and well-defined interpretation of water management. Reforms were required to ensure government agencies and water authorities would comply with a more extensive set of parameters measured by diverse environmental metrics, and to facilitate interagency cooperative planning, committee administration and integrated water management.

⁸ COAG is the peak intergovernmental forum in Australia, comprising the Prime Minister, State Premiers, Territory Chief Ministers and the President of the Australian Local Government Association.

⁹ Having endorsed the National Strategy for ESD, COAG agreed that the future development of all relevant policies and programs, particularly those which are national in character, should take place within the framework of the ESD strategy (COAG, 1992).

2.3 Microeconomic reform

The National Strategy for ESD also informed contemporary microeconomic reform, which in turn contains the origins of Australia's current water reforms – the COAG water reform agenda and National Competition Policy (NCP). The microeconomic reform agenda was particularly important in driving water reform, being more vigorously implemented than the National Strategy for ESD and better supported with institutional reforms (Dovers, 2002).

Microeconomic reform includes a broad suite of grass roots measures aimed at improving the performance of the economy, primarily through improving the efficiency of production and allocation of goods and services (Forsyth, 1992). The basic tool of microeconomic reform is fostering greater competition within both the private and public sectors of the economy which involves governments changing and adapting regulations and other measures to promote competition, efficiency and a more dynamic economy (Bureau of Industry Economics (BIE), 1996).

After World War II, Australia enjoyed three decades of favourable economic conditions; the regulatory structure of the economy was reasonably static and macroeconomic policies, such as controlled exchange rates, were the dominant settings relied on by governments (Forsyth, 1992). In the early 1970s, rising unemployment, high inflation and consistently low productivity growth signalled a decline in Australia's economic prosperity, raising doubts as to whether prevailing macroeconomic policies could continue to improve economic prosperity (BIE, 1996).

By the 1980s, the Australian Government recognised that macroeconomic policies such as tariff protection and capital market controls were impeding desired microeconomic improvements (such as increased competitiveness of manufacturing), and that macroeconomic settings were not conducive to transforming a non-competitive, inflexible and sluggish economy into a thriving one (BIE, 1996). From the early 1980s, governments

embarked on a program of extensive economic reform. The decade that followed saw the liberalisation of capital markets, the abolition of import quotas and phased reductions in tariff assistance (Productivity Commission (PC), 2005). Such reforms are consistent with neoliberal economic theory, which has been noted as having dominated Australian policy since the 1980s (Botterill, 2003).

As the reform program gathered pace, it became accepted that to transform the economy required addressing the underlying microeconomic problems impeding competition. A subsequent reordering of priorities resulted in extensive economic reform aimed at improving competitiveness across the economy, including in relation to Government Business Enterprises (GBEs) such as water infrastructure and supply agencies.

2.4 COAG and NCP reforms

In October 1992, the Australian Government established an independent inquiry into a national competition policy lead by Professor Fred Hilmer. The Hilmer Review was released in late 1993 and recommended that competition policy be pursued on a national basis to bring substantial productivity and sustainability benefits to Australia. In 1994, COAG agreed to implement the Hilmer Review's competition policy principles and to develop a wide-ranging NCP. The then Prime Minister commented that:

Competition policy will be introduced to large parts of the economy that until now have been sheltered from it, including utilities owned by Commonwealth and State governments...including ports, water, gas, electricity and rail.

Keating, 1994, p. 23

The Hilmer Review referred to the need to increase cost recovery levels for services such as water. Apart from providing a poor return to taxpayers, it was recognised that artificially low

prices encourage excessive consumption and distorted investment signals, with potentially costly consequences for the community and the environment (BIE, 1996). Thus, while water reform was in part a product of governments' commitment to the National Strategy for ESD, the real vehicle for change came in the form of microeconomic reform.

In 1994, COAG reached agreement on a comprehensive water reform agenda that explicitly linked economic and environmental issues in a package of reform measures aimed at creating an efficient and sustainable water industry. The 1994 COAG water reform framework included agreement that:

- water be used to maximise its contribution to national income and welfare, within the social, physical and ecological constraints of catchments;
- comprehensive systems of water allocations or entitlements backed by separation of water property rights from land title and clear specification in terms of ownership, volume, reliability, transferability and, if appropriate, quality;
- cross-border trading be facilitated and arrangements be consistent, where this is socially, physically and ecologically sustainable;
- allocations for the environment be a legitimate user of water; and
- environmental allocations be determined on the best scientific information available¹⁰.

These reforms exposed previously sheltered and inefficient water management activities to the disciplines of competition and reflect an attempt by governments to balance public and private rights and duties to promote economic, social and environmental results. Capturing the objectives of ecologically sustainable development and improved economic efficiency, the

¹⁰ For full detail see the Council of Australian Governments' Communiqué "Attachment A - Water Resource Policy", 25 February 1994, at http://www.coag.gov.au/coag_meeting_outcomes/1994-02-25/docs/attachment_a.cfm

COAG water reform framework represented a paradigm shift for governments and became the cornerstone of contemporary water management doctrine in Australia.

In 1995, COAG agreed to a far reaching six year program of competition reform (subsequently extended to 2005) in the NCP. The NCP program incorporated the previously agreed water reforms and tasked the National Competition Council (NCC) with assessing governments' progress in implementation. Satisfactory implementation of water reforms became a condition for state and territory governments to receive competition payments from the Australian Government.

2.5 Summary

The first 100 years of European settlement was typified by the ad hoc and opportunistic development of water resources. In the Australian colonies, water law was based on English common law. From the 1880s onwards, water resource policies were focussed on exploitation to promote economic and demographic growth and employment generation. Given Australia's scarce and extremely variable water supplies, drought-proofing the nation was subsumed in the ethos of national development and agrarianism, vigorously pursued and enacted. Private rights to water were subordinate to those of the State, and governments became extensively involved in the water industry as developers and owners of infrastructure and supply schemes.

This period of extensive and prolonged water diversion came to a relatively abrupt halt in the 1980s with the realisation of the economic and environmental costs of development. The confluence of the overallocation of water and lack of incentives for financial conservation had culminated in a situation of environmental degradation, unrelated institutional revenues and costs and a water sector supported by extensive subsidisation. The combination of events and the emergence of the twin focal points of ecologically sustainable development and economic efficiency provided the necessary impetus for the substantial reform of water management.

Shaped and conditioned by broader trends in natural resource management both in Australia and abroad, this change in management doctrine was set to become a recurring theme in policy initiatives of governments in the subsequent decades. The 1994 COAG water reforms and NCP embody this paradigm shift, as does the NWI almost a decade later.

Chapter 3 Australia's current water reforms

As outlined in the previous chapter, the 1994 COAG water reforms were the first attempt at a comprehensive national framework for improving water policy and management. However, it was largely left to individual jurisdictions to decide how to implement these reforms and progress was slow and variable (Watson, 2007). Protracted drought conditions experienced across much of Australia at the turn of this century established water as a prominent issue in the broader national consciousness. Scrutiny of previous policies intensified and highlighted the shortcomings of these reforms, and public and political debate focussed attention on the need for a more integrated and coordinated national approach to water management that could satisfy urban and rural demand while providing for the needs of the environment. A new blueprint for water reform emerged out of the public and political debate driven by a reaction to the protracted drought conditions. The blueprint was embodied in the 2004 National Water Initiative (NWI). To support the implementation of the NWI, the National Plan for Water was developed in early 2007, which with the change of Australian Government in late 2007 became Water for the Future, the Rudd Government's plan for water. The key objectives of the NWI, the National Plan for Water, and Water for the Future are detailed below in order to establish the central tenets and principles underpinning contemporary water reform in Australia.

3.1 The transition to a new intergovernmental agreement

As outlined in Chapter 2, the 1994 COAG water reform framework gave consideration to environmental management, pricing, trading in water entitlements, institutional reform, and improved public consultation. By 2003, implementation of these reforms had occurred to a significant extent. However, the areas in which the reforms were not fully completed were significant, namely:

- addressing overallocated systems and providing adequate water for the environment;

- opening up of trade out of irrigation areas in the southern Murray-Darling Basin; and
- in some jurisdictions, a lack of commitment to full cost recovery pricing (NCC 2002a).

The implementation of the 1994 COAG reforms was also inconsistent across states (Watson, 2007). This resulted in an array of water access entitlements, registries, trading arrangements, water products, water planning processes, pricing policies and approaches to the provision of water for the environment¹¹. In addition, some changes had not resulted in unequivocally better outcomes (NCC, 2002b), and the water debate had moved on considerably since the 1994 agreement was drawn up. For example:

- attempts to clarify water access entitlements highlighted the lack of security for water users in their entitlements and allocations;
- the 1994 agreement did not require states to address adjustment issues, causing significant uncertainty for irrigators and regional communities;
- the impact on the integrity of water entitlements from the interception of water by dams, forest plantations and other activities was not factored in;
- understanding about the importance of groundwater and the interconnectedness of systems had improved;
- volumetric water entitlements were recommended but had since been discredited in favour of share based entitlements; and
- the need to assign risk for changes in water allocations was not foreseen.

By 2003, it was also recognised that urban users had a responsibility to contribute to more efficient and sustainable water use practices (NCC, 2002a). The recent drought had focused the minds of urban Australians on the value of water and the need to use it wisely. An opportunity was recognised for governments to build on this heightened awareness to reduce

¹¹ This inconsistency can partly be attributed to the lack of specificity of the commitments under the 1994 framework, which also constrained the approach to assessments of progress undertaken by the NCC.

the demands on water supplies by increasing water use efficiency and the use of recycled water.

Ultimately, despite the efforts by states to improve management systems, widespread concern remained that water was not being used as efficiently as it might be and that insufficient progress had been made to redress environmental damage (NCC, 2002b). Indeed, the processes under way to address these concerns, such as implementation of water sharing plans, served to highlight the complexity of the issues to be addressed and amplified uncertainty in the community. It was accepted that to fully realise the economic and environmental potential offered by the 1994 agreement would require improved confidence in the economic framework for water management, underpinned by environmental water provisions and better management of environmental water (COAG, 2003).

In August 2003, COAG agreed there was a pressing need to refresh its 1994 water reform agenda to “increase the productivity and efficiency of water use, sustain rural and urban communities, and to ensure the health of river and groundwater systems” (COAG, 2003, p.1). COAG recommitted to completing the NCP water reform agenda and developing the next phase of water reform through an Intergovernmental Agreement on a National Water Initiative (NWI).

3.2 The National Water Initiative

Getting to this position has been a remarkable journey that just four or five years ago could not have been predicted. I remain convinced of the historic opportunity for our country presented by the National Water Initiative.

The Hon John Anderson MP, 8 May 2004

Enacted in 2004, the NWI is Australia's blueprint for achieving a nationally compatible market, regulatory and planning based system of managing water resources.

The National Water Initiative proposes a revolution in Australian water management, a quantum leap in the magnitude and complexity of water management and its related institutions.

Connell, Robins and Dovers, 2007, p.127

The NWI represents a shared commitment by the Australian Government and state and territory governments to water reform in recognition of the:

- continuing imperative to increase the productivity and efficiency of water use;
- need to service rural and urban communities; and
- importance of ensuring the health of river and groundwater systems, including by establishing clear pathways to return all systems to environmentally sustainable levels of extraction (COAG, 2004).

Australian governments agreed to the NWI with the expectation that it would optimise economic, social and environmental outcomes from water management, and underpin the capacity of Australia's water management regimes to deal with change responsively and fairly (NWI, preamble 5). To this end, full implementation of the NWI is expected to achieve:

- expansion of trade in water bringing about more profitable use of water and more cost effective and flexible recovery of water to achieve environmental outcomes;
- more confidence for those investing in the water industry due to more secure water access entitlements, better and more compatible registry arrangements, better monitoring and accounting of water use, and improved access to information;
- more sophisticated, transparent and comprehensive water planning that deals with key issues such as the major interception of water, the interaction between surface and

groundwater systems, and the provision of water to meet specific environmental outcomes;

- a commitment to addressing overallocated systems as quickly as possible, in consultation with affected stakeholders, addressing significant adjustment issues where appropriate; and
- better and more efficient management of water in urban environments, for example through the increased use of recycled water and stormwater.

In particular, the NWI provides a framework to address and deliver the more difficult COAG water reform commitments where little progress had been made, and focuses on areas in which greater compatibility in water management across jurisdictions would enhance outcomes. The National Water Initiative sets out objectives, outcomes and actions for the ongoing process of national water reform in the areas of:

- water access entitlements and planning;
- water markets and trading;
- best practice water pricing;
- integrated management of water for environmental and public benefit outcomes;
- water resource accounting; and
- urban water reform (full text of the NWI at Attachment A).

Commitments to specific and often interrelated actions associated with each of these outcomes include state-specific actions, actions to be completed collectively by states, and a number of coordinated national actions. Every state and territory was required to submit an Implementation Plan for accreditation by the National Water Commission¹² to detail how it will address the actions in the NWI over the coming years. Nearly half of the approximately 70 specific actions in the NWI involve national actions or other action by governments

¹² The National Water Commission was established as an independent statutory body to drive the national water reform agenda and to provide advice to COAG on national water issues.

working together. This reflects not just the emphasis in the NWI on greater national compatibility in the way Australia measures, plans for, prices and trades water, but also represents the desire to see a greater level of cooperation between governments to achieve this end (NWC, 2007).

3.3 Outcomes expected under key themes of the NWI

3.3.1 Water access entitlements and planning framework

Effective water planning is fundamental to the reforms being driven by the NWI. Water planning assists governments and the community in the adaptive management of surface and groundwater systems in order to meet productive, environmental and other public benefit outcomes (Gentle and Olszak, 2007). Settling the trade-offs between these competing demands should involve judgements informed by best available science, socio-economic analysis and community input (NWC, 2007). Accordingly, the NWI requires that statutory-based water plans are prepared for surface water and groundwater management units in which entitlements are issued. It also requires recognition of the connectivity between surface and groundwater resources so that connected systems are managed as a single resource. In order to meet the NWI commitments, water plans were to be substantially complete for overallocated systems by 2005. There was also to be substantial progress towards the return of all currently overallocated or overused systems to sustainable levels of extraction by 2010.

At the same time, a key objective of the NWI is to enhance the security and certainty of water access entitlements by clearly specifying the statutory nature of those entitlements and ensuring that they possess clear and nationally-compatible characteristics (NWC, 2006). This includes ensuring that entitlements clearly assign the risks arising from future changes to the consumptive pool. It also requires entitlements and planning frameworks that protect the integrity of water access entitlements from unregulated growth in interception through land-use change (NWI, Paragraphs 25-57).

3.3.2 Water markets and trading

Water trading is a centrepiece of national water reform and while not to be viewed as an end in and of itself (Hussey and Dovers, 2007), is critical to ensuring increasingly scarce water resources are allocated according to their most productive use. The 1994 COAG water reforms required the separation of water rights from land, a necessary first step to expand trade in water. The reforms also sought to open up trading arrangements, including interstate trading. COAG subsequently agreed in the NWI to an “expansion of permanent trade in water bringing about more profitable use of water and more cost effective and flexible recovery of water to achieve environmental outcomes” (COAG, 2004, p.1). This was primarily to promote an expansion of the area of coverage and the volume of trade and to overcome the barriers to some forms of water trade. An effective market for water trading provides flexibility in responding to emerging issues such as drought and climate change.

The expected outcomes from implementing water market reforms are to facilitate the operation of efficient water markets and opportunities for trading, within and between states, where water systems are physically shared or hydrologic connections and water supply considerations will permit. The NWI seeks to minimise transaction costs on water trades, including through good information flows in the market and compatible entitlement, registry, regulatory and other arrangements across states. The other key tenets associated with implementing water markets and trading include enabling the development of an appropriate mix of water products, based on access entitlements and allocations that can be traded either in whole or in part, or through leasing or other arrangements and to recognise and protect the needs of the environment and provide appropriate protection of third-party interests (NWI, Paragraphs 58-63).

3.3.3 Best practice pricing and institutional arrangements

Appropriate pricing of water and water-related services plays a key role in providing signals to users on using the resource efficiently and in ensuring that services and resource management activities are adequately funded (Watson, 2006). The expected outcome from the implementation of the water pricing actions of the NWI is for states to have water pricing and institutional arrangements that promote economically efficient and sustainable use of water resources, water infrastructure assets and government resources devoted to the management of water.

The water pricing principles underpinning the NWI also aim to ensure sufficient revenue streams to allow efficient delivery of the required services. They attempt to facilitate the efficient functioning of water markets in both rural and urban settings and to give effect to the principle of ‘user-pays’ and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management. Consistent through the pricing reforms agreed to in the NWI is the aim to avoid perverse or unintended pricing outcomes (NWI, Paragraphs 64-77).

3.3.4 Integrated management of water for the environment

The outcome for integrated management of environmental water under the NWI is to identify the environmental and other public benefit outcomes being sought for water systems and to develop and implement management practices and institutional arrangements that will achieve those outcomes. Importantly, this incorporates adopting and implementing the principles developed under the NWI for recovery of water in overallocated and overused systems and a return to sustainable levels of extraction (Gardner and Bowmer, 2007).

The expected outcomes from undertaking the agreed NWI actions are to have environmental and other public benefit outcomes for water systems identified with as much specificity as possible in water plans and management practices and institutional arrangements in place to

achieve identified environmental outcomes. Critical to achieving these outcomes are accountable environmental water managers. Environmental water managers should be established and equipped with the necessary authority and resources to provide sufficient water at the right times and places to achieve these outcomes including across state boundaries where relevant (NWI, Paragraphs 78 and 79).

3.3.5 Water resource accounting

Water resource accounting is the application of a consistent and structured approach to identifying, measuring, recording, aggregating and reporting water information including its occurrence, extraction, diversion, storage, trade, use, loss and discharge. Without effective measurement and monitoring, it is difficult to adequately manage the resource.

The NWI recognises that accounting systems and measurement practices between and within states can vary widely and make it difficult to provide a consistent picture of water resources across Australia. The NWI imposes a number of requirements designed to ensure that water accounting is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management. This in turn will build public and investor confidence in the amounts of water being traded, extracted for consumptive use, and recovered and managed for environmental and other public benefit outcomes (NWI, Paragraphs 80- 89).

3.3.6 Urban water reform

The objectives for urban water reform outlined in the NWI are to provide healthy, safe and reliable water supplies to urban areas, to increase water use efficiency in domestic and commercial settings, and to encourage re-use and recycling of wastewater where cost effective. The NWI also aims to facilitate water trading between and within the urban and rural sectors, encourage innovation in water supply sourcing, treatment, storage and discharge, and achieve improved pricing for metropolitan water.

The NWI framework of actions aimed at achieving urban water reform is presented in two parts: demand management actions, aimed at increasing urban water use efficiency; and actions that encourage innovation and build capacity to create water sensitive urban cities.

Achieving the desired outcomes for urban water reform will also depend on implementation of the NWI as a whole. Successful urban water reform depends in particular on successful implementation of the water planning framework, opening up water markets and implementing best practice water pricing and institutional arrangements.

More recently, urban water reform has become imperative as states continue to grapple with securing urban water supplies. A number of actions have been undertaken by jurisdictions over and above their NWI commitments, as a result of the major change in circumstances facing the industry since 2004. Many of the actions undertaken have been investments in large scale infrastructure works to improve urban water security (NWI, paragraphs 90- 92).

3.4 Recent institutional change

There have been a number of institutional changes in the period since the signing of the National Water Initiative in 2004. However, these recent changes recognise the primacy of the NWI as the blueprint for water reform in Australia, and have been developed to support, and in some instances extend, the desired NWI outcomes for water reform.

3.4.1 National Plan for Water

In the face of this protracted drought we need a radical and permanent change in our water management practices.

Prime Minister John Howard, 25 January 2007

In January 2007, the then Prime Minister recognised the drought gripping large parts of Australia as being one of the most severe ever documented, and declared that Australia

needed to “address overallocation as well as face up to the likelihood of reduced inflows in the future” (Howard, 2007, p.3). In recognition of these challenges and the need for Australia to “adapt by reducing the use of water, and use what we have more efficiently”, the *National Plan for Water* (the Plan) was announced (Howard, 2007). With a special focus on the Murray-Darling Basin, the Plan was designed to accelerate implementation of NWI outcomes. In particular, these initiatives were aimed at reducing overuse of water in the Murray-Darling Basin and to substantially increase the water use efficiency of irrigation.

While recognition of the severity of Australia’s water management challenges was welcomed, critics of the Plan suggested it was “both hurriedly prepared and ambitious, perhaps reflecting the political desperation of a government who had been ‘on watch’ for over a decade and in whom the public was beginning to express its discontent” (Cruse, 2007, p.10). As Watson (2007, p.1) notes, the authors of the plan were “not claiming spurious accuracy for their major proposals. As subsequently emerges, the ten-point plan to spend \$10 billion over ten years was prepared in haste, well away from the troublesome gaze of Treasury and Finance officials and the experienced eye of the Murray-Darling Basin Commission”.

In noting that the largest portion of the funding (\$6 billion) was assigned to engineering solutions to enhance irrigated agriculture, critics claimed the Plan broadly comprised a roadmap for a trip ‘back to the future’; that the deficiencies of exuberant investments in irrigation that occurred between the mid-1800s and the later 1900s seem likely to be revisited under the plan (Cruse, 2007). Connell and Grafton (2008) accurately point to insufficient rigour in the processes being developed to assess trade-offs in using public funds to promote water security, as well as the risk that infrastructure investments may be followed by the wholesale purchase of water entitlements – rendering such infrastructure investments redundant.

3.4.2 Water for the Future

The *National Plan for Water* triggered a subsequent wave of institutional change. In April 2008, the Rudd Government outlined details of *Water for the Future*, a reformulated national plan for water with a total of \$12.9 billion in funding over 10 years designed to secure the long-term water supply across Australia. This represents an extension of the former government's \$10.5 billion commitment under the National Plan for Water; in effect adding a further \$2.4 billion to that plan to invest in new urban water projects to help secure water supply in urban areas.

Reflecting this sharper focus on urban water, the 2008/09 Commonwealth budget provides \$1 billion for the National Urban Water Desalination Plan, \$250 million for the National Water Security Plan for Cities and Towns; and \$250 million for the National Rainwater and Greywater Initiative. These programs are expected to help deal with the impacts of climate change and reduce urban Australia's reliance on rainfall by investing in desalination, water recycling, stormwater re-use and efficient water infrastructure.

3.4.3 Water Act 2007

The Commonwealth *Water Act 2007* was enacted to make provision for a number of elements of the National Plan for Water. The *Water Act 2007* establishes the Murray-Darling Basin Authority (MBBA), responsible for developing a Basin Plan for the integrated and sustainable management of water resources in the MDB. The 2011 Basin Plan will include a revised Cap and will regulate both surface and groundwater diversions.

The *Water Act 2007* establishes the Commonwealth Environmental Water Holder to manage the water entitlements that the Commonwealth acquires. These water entitlements will be used to protect or restore the environmental assets of the Murray-Darling Basin or assets outside the Basin where water is held for that area. Environmental water will be used in

accordance with the environmental watering plan that is to be prepared by the Murray-Darling Basin Authority

Importantly, the *Water Act 2007* also creates a role for the Australian Competition and Consumer Commission (ACCC) in Australia's water reform agenda. The ACCC is responsible for providing advice to the Minister for Climate Change and Water on water market rules and water charge rules, as well as providing advice to the Murray-Darling Basin Authority on water trading rules. It will also monitor and enforce compliance with the water market rules and water charge rules. The aim of these new functions is to ensure greater consistency and transparency in water charging arrangements and that water markets are able to operate freely. The ACCC does not, however, have any roles under the *Water Act 2007* in relation to urban water supplies or water resources other than Murray-Darling Basin water resources.

3.4.4 Memorandum of Understanding on Murray-Darling Basin Reform and Intergovernmental Agreement on Murray-Darling Basin Reform

The March 2008 *Memorandum of Understanding on Murray-Darling Basin Reform* (MOU) and July 2008 *Intergovernmental Agreement on Murray-Darling Basin Reform* (IGA) represent agreement by all six governments with responsibilities in the MDB about how to implement changes outlined in the *Water Act 2007*. The MOU represents agreement that the Commonwealth Minister is the final decision maker for the Basin Plan and endorses the overall \$10 billion budget made under the *National Plan for Water*. However, a condition of agreement to the MOU was that existing water sharing plans will continue until their expiry dates, or not until 2019 in some cases. As Connell and Grafton (2008) note, honouring plans until 2019 could impose very high transition costs to the environment and water security if current extreme conditions continue.

3.5 Summary

The 1994 COAG water reforms resulted in significant progress in some areas but protracted drought focussed attention on many deficiencies in this approach. Uncertainty hampered investment in more efficient production systems in some areas and the absence of a functioning water market impeded the movement of water towards its most productive use. Furthermore, there were significant concerns over the pace of securing adequate environmental flows and adaptive management arrangements to ensure river health.

The development of the NWI, as detailed in this chapter, allowed for a significant raising of the bar. It reflected a desire among governments to improve the quality and effectiveness of the national reform effort, to ensure the problems that had begun to emerge over the past decade did not become commonplace, and to ensure the best possible use was made of limited resources in the face of competing demands.

The goal of the NWI is essentially to achieve the efficient and sustainable use of water. It contains actions aimed at delivering a more robust and adaptive water management framework, and in particular covers a range of areas in which greater compatibility and the adoption of best practice approaches to water management nationally will bring substantial benefits. As observed by Connell et al. (2007, p.138), the institutional reform agenda implicit and explicit in the NWI is very significant though “nonetheless to be expected given the nature of the NWI as an innovative and far-reaching proposal for implementing, in the Australian water context, the difficult and long-term idea of ecologically sustainable development”.

The National Plan for Water was designed to accelerate the implementation of the NWI, as is the amended and retitled package *Water for the Future*. Significantly, these latter plans demonstrate an acceptance by governments of the need to accelerate and more fully implement the NWI, as well as extending reforms in relation to the urban water sector, in

light of the challenges presented by climate change. The extent of these challenges and implications for water management are explored in the following chapter.

Chapter 4 Current and emerging policy drivers

The primary goal of water policy and management in Australia has been securing water for consumptive use while, more recently, ensuring environmental sustainability. The driving forces behind this goal are protracted drought; increased demand for water; the decline of water dependent ecosystems; and climate change. These impacts are likely to continue to be severe for Australia, intensifying the effects of existing policy drivers. Projected decline in rainfall and rise in temperature due to climate change is likely to result in further decreases in supply and increases in demand in areas¹³ where water resources are already under significant stress as a result of unprecedented drought, their history of use, and growing population (Campbell, 2008). Ensuring an efficient and sustainable supply of water for competing uses under these conditions will be the critical test of Australia's water policy and management framework.

This chapter begins by providing a summary of current and emerging drivers of water policy and management as listed above. The overview of the expected impacts of climate change presented here is not intended to be exhaustive, but rather a synthesis of the most relevant and credible predictions to-date. This includes information from the 2007 Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), as well as the Commonwealth Scientific and Industrial Research Organisation (CSIRO) *Sustainable Yields Project* (2008), which provides a detailed assessment of the impact of climate change on water availability. This latter work, the largest single research project undertaken by the CSIRO, considers the likely impacts of climate change on water and provides insight into the current and emerging drivers of water policy and management. Understanding these challenges is necessary for an informed assessment of the capacity of the water reform framework to secure Australia's water future.

¹³ Particularly south eastern Australia and south west Western Australia.

4.1 Protracted drought

As noted previously in this work, drought is a common occurrence in Australia. However the duration and severity of the current drought is without historical precedent, and the last decade has seen a significant decline in rainfall combined with record warm temperatures over large parts of the country, including almost all of the Murray-Darling Basin. Four out of the ten hottest years on record in the Murray-Darling Basin have occurred since 2001 (BOM, 2007). Rainfall, runoff and storage figures during this period paint a bleak picture. August 2006 and September 2007 experienced the lowest August and September rainfall on record across Australia. For large parts of southern and eastern Australia, dry conditions have persisted since October 1996, a total of over 12 years. Parts of Victoria (especially in the north-eastern ranges and around Melbourne), north-eastern Tasmania and southern coastal South Australia have experienced their driest periods on record (BOM, 2008).

The current dry period and low water availability can be put into perspective by comparisons with previous extended drought in the mid-twentieth century. For the three years ending October 2008, Murray system inflows were 6,100 gigalitres, which is almost half the previous three year minimum prior to this drought of 11,300 gigalitres in 1942–45 and less than a quarter of the long term average. The current drought has also recorded the lowest inflows for virtually all periods from one month to ten years, with the 2008-09 water year currently tracking as the 7th driest in 117 years of records (MDBC, 2008).

Consequently, storage levels across the country remain low. Inflows to storages indicate that over the past 10 years the average is around half the long term average taken over the past 100 years. Melbourne has received 65 percent of its long term average, Brisbane 44 percent, Sydney and Perth 43 percent and Adelaide 65 percent (WSAA, 2008). As at November 2008, Brisbane, Melbourne, and Perth continue to operate under 50 percent of dam storage capacity and all major cities continue to impose water restrictions with exception of Darwin and Hobart. For a number of capital cities even with average inflows, or slightly above average

inflows, it would take many years for the storage levels to recover to the point where restrictions may no longer be needed (WSAA, 2008).

4.2 Increasing demand

The downturn in rainfall during the last decade over eastern Australia has been accompanied by growth in demand and there has been unprecedented pressure on water availability in both the urban and agriculture sectors (NWC, 2008). This is particularly evident in eastern Australia, where a high proportion of water resources are already fully or overallocated (NWC, 2007). The most recently published data on water use across the economy, *Water Account, Australia 2004–05* (Australian Bureau of Statistics, cat. no. 4610.0) showed agriculture to account for 65 percent of all water consumed within Australia, with irrigation being the major use of water for agricultural businesses. Climatic conditions affect both the availability of water for irrigation and the need to irrigate in order to supplement rainfall. Reduced rainfall and warmer average temperatures have reduced the water available for irrigation while increasing the need for irrigation water.

Similarly, the urban water industry is “caught in a double squeeze, as inflows to storages serving urban Australia continue to be well below average and populations in urban areas continue to increase rapidly” (WSAA, 2008, p.3). Eighty-five percent of Australians, some 17.6 million people, live in cities. During 2007-08, the average population growth in Australia’s major urban areas was 1.6 percent or a total of 227,800 people (ABS, cat no 3218.0 – Regional Population growth, Australia, 2006-07).

Over the next quarter century, more than 90 percent of national population growth, an additional 4.5 million residents, will occur in Sydney, Melbourne, South-East Queensland and Perth. Without intervention, urban areas are forecast to face a shortfall in water supply of 640 gigalitres a year (CSIRO, 2008).

4.3 Decline of water-dependent ecosystems

Many of Australia's rivers and floodplain wetlands and forests have been degraded and some have suffered significant loss of area over recent decades due to changes in flooding and land use (CSIRO, 2008).

The condition of the Coorong and Lower Lakes in South Australia is grave and deteriorating. There has been no flow through the barrages since 2006 and last week we started pumping water into Lake Albert to prevent any further exposure of sulfidic sediments.

Dr Wendy Craik, Chief Executive MDBC, Drought Update May 2008

The internationally recognised wetlands of the Lower Lakes and Coorong in South Australia are in a critical state, with record low water levels, high salinity and the ongoing risk of acidification (MDBC, 2008b). The 2008 Senate Standing Committee Inquiry into water management in the Coorong and Lower Lakes found that “the prolonged dry period across the southern half of the Basin continues to severely impact on wetland and floodplain ecosystems across the Basin. Whilst portions of the Barmah-Millewa Forest have received limited flooding as recently as 2005, there has not been any significant flooding in the mid and lower floodplains of the Murray downstream of Euston for many years”. Floodplain vegetation is under severe stress. The 2007 Living Murray Icon Site condition report indicates that up to 80 percent of River Red Gums are “unhealthy, severely stressed or dead” (MDBC, 2007, p.8).

Protracted drought combined with increased consumptive demand means water available for environmental use is very low. In the Murray-Darling Basin, river operations are focussed on supplying water to users as efficiently as possible, with special water saving measures in place along the river to try to minimise evaporation losses from lakes and wetlands. As a consequence, wetland and floodplain vegetation is under severe stress. At the end of 2007, less than one percent of current divertible water was available for critical environmental

watering projects (MDBC, 2007). The situation has not improved in 2008, with below average rainfalls and extremely low system inflows, increasing the stress on wetlands which were disconnected to cut evaporative losses (MDBC, 2008). The Murray-Darling Basin Commission's June 2008 Sustainable Rivers Audit report reveals that of the Basin's 23 rivers, only the Paroo in western Queensland was in a good state of ecological health.

4.4 Climate change – projections for Australia

The warming of the Earth's climate is evident from increases in global average air and ocean temperatures, melting of snow and ice, and rising sea levels. Numerous changes in climate have been observed at the scales of continents or ocean basins, including wind patterns, precipitation, ocean salinity, ocean acidification, sea ice, ice sheets, and aspects of extreme weather. These are the conclusions of the most comprehensive and authoritative analysis of the Earth's climate – the 2007 Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC)¹⁴.

The IPCC report found that more intense and longer droughts have been observed over wider areas since the 1970s. Increased drying linked with higher temperatures and decreased precipitation has contributed to changes in drought. Changes in sea surface temperatures, wind patterns and decreased snowpack and snow cover have also been linked to droughts (IPCC, 2007). The IPCC concludes that for the next two decades, a global warming of about 0.2 degrees per decade is projected for a range of emissions scenarios (IPCC, 2007).

The Australian climate has changed notably over the past 50 years (Garnaut Climate Change Review, 2008). In terms of temperature, Australia is already experiencing what the climate models have been predicting for some time (Campbell, 2008) and historic greenhouse gas emissions have already committed Australia to substantial further warming through the

¹⁴ The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environmental Program (UNEP) to provide an assessment of all aspects of climate change.

twenty first century (Garnaut Climate Change Review, 2008). While Australia has always had a highly variable climate, the amplitude of that variability is being exacerbated by climate change (Campbell, 2008). Climate change therefore presents a major challenge for managing water in Australia. An initial assessment of climate change projections and water resources in Australia contained in the CSIRO 2007 *Preliminary Risk Assessment* indicates that:

- Temperatures, and hence potential evaporation, will increase across much of Australia. By 2070 average annual temperatures are likely to exceed 2°C over most of the country and may be up to 6°C higher inland; and
- Rainfall across much of eastern and far south-western Australia will decrease and become more variable. Estimates for 2070 over many areas (including all the major metropolitan areas) approach a 20 percent reduction.
- Increases in potential evaporation combined with the projected decline in rainfall are expected to significantly increase the frequency and severity of drought.
- Extreme rainfall will increase. Flood risks are expected to rise, especially in some coast regions where projected extreme rainfall increases are highest (CSIRO, 2007).

The impact of increasing temperatures and evaporation, reduced rainfall, and increased drought severity on water availability is likely to be substantial. The effect of reductions in rainfall generally has an amplified impact on runoff such that a 1 percent drop in mean annual rainfall can decrease mean annual runoff by 2–3 percent (CSIRO, 2007).

4.5 Future water availability – CSIRO Sustainable Yields Project

There has never been a water resource inventory at this scale anywhere in the world... nobody has looked at surface and groundwater resources under past and future climate scenarios at this level of detail.

Dr Tom Hatton, Director CSIRO, ECOS February-March 2008, p.8

Following the November 2006 Summit on the southern Murray-Darling Basin, the then Prime Minister and Murray-Darling Basin state premiers commissioned CSIRO to report on sustainable yields of surface and groundwater systems within the Murray-Darling Basin. In March 2008, COAG agreed to extend the CSIRO Sustainable Yields study to south-western Western Australia, Tasmania and northern Australia for completion by June 2009. The project represents the most comprehensive hydrologic modelling being undertaken to predict the impacts of climate change on the availability of water resources. The project links groundwater balances and surface water availability with the CSIRO model calculating flows through and between the Basin's rivers, as well as groundwater and surface water interactions under current water sharing arrangements, before estimating the water available under each of the scenarios presented in the 2007 IPCC 4AR.

In the Murray-Darling Basin, water yield assessments were undertaken and reported on an individual catchment and aquifer basis for each region¹⁵, and for the Basin overall.

Recognising that only the Murray-Darling Basin regional and final reports are yet complete, findings of the project so far indicate that in parts of the Basin:

- The best estimate of climate change by 2030 would reduce average surface water availability by up to 10 percent and reduce surface water diversions by up to eight percent.
- Under the dry extreme 2030 climate there would be decreases of up to 29 percent in average water availability and up to 25 percent in surface water diversions.
- Likely future development of farm dams and groundwater would reduce average river inflows by up to three percent and reduce surface water diversions by up to four percent.
- If the recent climate (1997-2006) were to continue for the long-term, both average surface water availability and use in the Wimmera would decline by about 50 percent.

¹⁵ The Paroo, Warrego, Condamine-Balonne, Moonie, Border Rivers, Gwydir, Namoi, Macquarie-Castlereagh, Barwon-Darling, Lachlan, Murrumbidgee, Murray, Ovens, Goulburn-Broken, Campaspe, Loddon-Avoca, Wimmera and Eastern Mount Lofty Ranges.

- Flooding of wetlands would be far less frequent and the average annual flooding volume would be half the current volume and only 29 percent of the pre-development volume.

4.6 Implications

In urban areas, a reduction in water availability owing to climate change would increase the amount by which water demand currently exceeds supply. Rainfall-dependent water sources such as dams will be less reliable. While new storages may improve supply security for some cities, inflows rather than storage capacity are likely to be the limiting factor on supply from dams. Reduced surface water availability is likely to increase demand on groundwater. To minimise the risk of this resource becoming over utilised, groundwater resources would need to be better defined and managed, particularly where there is connectivity between groundwater and surface water systems.

Without ready access to groundwater supplies, remaining supply options for urban areas include transfer and trades of water from agriculture and the environment, and non climate-dependent supply options such as desalination and recycling. Significantly, supply options such as desalination may not be available or economically viable in regional cities and towns. In such instances, increased local competition for water resources between irrigators, towns and the environment is likely. Increasing climate variability, particularly in the frequency and magnitude of extreme rainfall events could also affect water management infrastructure, with extreme rainfall events presenting challenges for stormwater management.

In rural areas, a reduction in the availability of water as a result of climate change will have a significant impact on irrigated agriculture. Drought of increasing frequency and intensity will reduce allocations and ultimately the security of entitlements. This will affect water values, patterns of water use and investment, and will inevitably contribute to major changes in the

structure and composition of the irrigation sector. Increasingly scarce and variable water supply will increase the importance of water markets to reallocate scarce water resources. Efficiency gains in the transmission and use of water could offset some reduction in the availability of water. However, a sustained reduction in allocations is likely to affect the suitability of some irrigation practices in some areas. This will impact on communities and regional economies and increase adjustment pressure in these areas.

Climate change could also alter the suitability of land for forestry and revegetation activities. In fully allocated systems, new developments requiring water are likely to reduce the security of supply to existing uses. In some areas, plantation establishment may therefore require the purchase of a water right to offset reduced runoff due to higher rates of evapotranspiration. However, water accounting methods would require a range of further improvements to establish accurate water budgets linking forestry and water use in particular catchments.

Reduced rainfall and runoff would threaten environmental flows and water quality needed to sustain the ecological health of rivers, lakes and wetlands. In many developed catchments, flow modifications already impact on aquatic and floodplain ecosystems, and these effects would be exacerbated by a reduction in the availability of water as a result of climate change. These impacts relate not only to the volume of environmental water, but the timing of its delivery to waterways and ecosystems.

Changes in rainfall and average temperature will lead to reduced average flow and periodic extreme flow events. Climate change will alter flow regimes and will also affect aquatic health through changes in water temperature, water quality, and primary production. Water quality may decline due to fire, extreme flow and erosion events and reduced dilution flows under typical conditions (Campbell, 2008). Other impacts may include algal blooms, decline in permanent wetlands and stream systems, floodplain and wetland ecosystem decline, shortage of water for the environment, and reduced fauna migration (Campbell, 2008).

Securing water allocations for the protection of aquatic ecosystems will require a greatly improved understanding of ecosystem responses to flow regulation and water diversion. It will be important to determine the extent to which flow regime change alone can provide the desired environmental outcomes, and the extent to which other pressures must also be addressed.

4.7 Summary

Many of Australia's water resources are already heavily utilised and under stress. A high proportion of water resources are already either fully or overallocated in eastern Australia. Projected climate change can be expected to exacerbate these pressures, including in agricultural and urban areas. Likely reductions in runoff in south-east and south-west Australia would directly lead to a fall in river flows, catchment water yield, inflows into storages, irrigation pumping and environmental flows. As water storages are dependent on the variability and the sequence of inflows, increases in the variability of river flows or extended periods of low river flows will put storages at risk.

The implications of combined current and emerging drivers of change are significant; climate change is almost certain to exacerbate existing impacts. Achieving secure water supplies will require a far better understanding of water resources and greater flexibility in management and use of water. Improving the use of meteorological and hydrological data in planning and management, increasing sources of water supply and conservation, and securing access to water through entitlements and trade will be critical.

However, the parallels between what is required to adapt to a future characterised by an increasingly variable climate and the objectives of the current water reform agenda suggests current reforms provide a suitable policy response. The expected reductions in water

availability owing to climate change underscores the importance of work already underway in response to scarcity issues and the issue of providing a secure, efficient and environmentally sustainable water supply for competing uses. As outlined in Chapter 3, this includes ongoing work to improve urban water planning and management; entitlement definition and trading; water accounting; integrated management of environmental water; handling of groundwater and surface water interaction; and dealing with interception of water from land-use change. Less water available for agricultural use, for example, would underscore the importance of the efficient allocation of available supplies through water trade.

The expected impacts of climate change on water resources in Australia are therefore not dissimilar to the current or historical drivers of water policy and management, as outlined in Chapter 2. Australia is fortunate, therefore, to have a sophisticated water reform agenda in place shaped by these existing policy drivers, and which aims to deliver the flexibility and certainty required to respond to the impacts of climate change.

Australia is fortunate, also, in that it has an agreed reform agenda – the NWI – which is expected to deliver a framework for water policy and management able to respond to these current and emerging impacts. As the required tools and strategies are embedded in current reforms, it is essential that they are fully operational and that their successful implementation results in the anticipated outcomes. The following chapter assesses whether this is the case.

Chapter 5 Assessment of progress of water reforms

The NWI provides a basis for adaptive management in the face of changes to the resource base, including those arising from climate change. As outlined in Chapter 4, the NWI consists of objectives and actions designed to facilitate improved water planning, entitlements to access water based on sustainable levels of extraction, water trading, provisions for risk assignment and a step-change in water accounting and measurement. These elements, theoretically, reflect the NWI's adaptive capacity. The purpose of this chapter is to review the progress of the implementation these multiple elements of the NWI since its establishment in June 2004. The evaluation of the successes and deficiencies in water reform, identified through the following analysis, will assist in understanding whether the current reform agenda is likely to result in a water management framework capable of meeting current and future water challenges. Overall, the chapter analyses specific areas of reform which need to be more fully implemented and accelerated in order to meet Australia's water challenges.

This review draws from the author's experience as Senior Manager of Water Markets and Assessments at the National Water Commission (Commission). Specifically, the analysis draws on insight gained as lead author of the 2008 *Update of Progress in Water Reform (Update Report)* to the Council of Australian Governments, as well as knowledge gained as a contributor to the 2007 *Biennial Assessment*. Under the NWI, the Commission is required to undertake biennial assessments of progress in implementing the NWI (NWI paragraph 106). The biennial assessments are the primary mechanism for reviewing progress in national water reform.

The focus of the analysis presented here is similar to that of the 2007 *Biennial Assessment* and 2008 *Update Report*, that is, progress is assessed against the outcomes and objectives of key elements of the NWI. To assist in this analysis, this review draws on information contained in submissions provided to the Commission by Commonwealth, state and territory governments,

the Raising National Water Standards project reports, Commission meeting and working group papers, and from the author's discussions and interaction with senior Commonwealth, state and territory government officials and industry stakeholders. Significantly, this work extends the previous Commission assessments of 2007 and early 2008, taking into consideration developments since their completion including the significantly improved understanding of the impacts of climate change on water availability, recent RNWS work in areas such as environmental water, water markets and water planning, and the development of a new COAG work program for water. Since the previous Commission assessments, the Commonwealth's funding of, and role in, water policy and management has significantly expanded, particularly in the Murray-Darling Basin. Unpublished primary material such as reports prepared for the Commission and COAG accessed through the author's work at the Commission allow these new developments and emerging information to be incorporated in this applied policy analysis. In addition to taking into account new knowledge and policy developments, this work significantly differs from and adds to the Commission's previous assessments by placing the assessment of reforms in a broader frame, critiquing and assessing the adequacy of the overall reform agenda in relation to current and emerging drivers of water policy and management.

5.1 Water access entitlements and planning

5.1.1 Progress to date

Almost all states and territories have water access entitlement and planning frameworks as prescribed by the NWI, particularly in high-priority water systems (Lawlab, 2009). New South Wales, Victoria, Queensland and South Australia have put in place or amended legislation to incorporate elements of the entitlement and planning frameworks prescribed by the NWI (e.g. amendments to Part 2 of the NSW Water Management Act 2000). Western Australia has drafted legislation to give effect to its NWI commitments, scheduled to go

before parliament in 2009. Tasmania, the Northern Territory and the Australian Capital Territory have reviewed their legislation to ensure that it meets NWI requirements.

Across all states, there are clear examples of improved planning practices, and of processes in which there have been opportunities for productive, environmental and other public benefit considerations to be identified and acted upon. For example, considerable resources have been committed to stakeholder engagement and knowledge building to improve water planning and management in northern Australia¹⁶. South Australia has developed methods for assessing the impacts of plantation forestry on reducing recharge to groundwater systems, and processes to incorporate forestry entitlements into existing water access entitlement frameworks¹⁷. On paper, all states have made statutory provision for environmental allocations within water plans to protect water sources and their dependent ecosystems (Lawlab, 2009). Progress has been made in establishing environmental water; in the identification and prioritisation of environmental assets; and in improving environmental water management practices (discussed further in section 5.4).

5.1.2 Ongoing implementation issues and priorities

While some jurisdictions offer examples of improved entitlement and planning frameworks, no jurisdiction can yet claim a fully effective water planning system. Advancement can be seen in the establishment of some forms of water entitlements, but factors exist which reduce water user and stakeholder confidence in the security of water entitlements. As described in the Commission report *New Water Entitlement Products for Australia: A Thinkpiece* (SKM, 2008) this is particularly the case for environmental water and for urban stormwater and recycled water, where uncertainty remains around entitlement definition and ownership. Improving the quality and extent of science underpinning water plans – especially a better understanding of the relationships between water and the environment – as well as better

¹⁶ Consistent with the requirement to determine “estimated sustainable yield to beneficial uses” under NT *Water Act 2007* section 22B(5).

¹⁷ See SA Natural Resources Management Act 2004, Chapter 4, NRM plans.

defining the available resource, should facilitate the development of more specific and secure entitlements.

The Commission's Waterlines paper *Water Allocation Planning in Australia – Current Practices and Lessons Learned* (Hamstead et al., 2008) found that despite considerable progress in the development of water plans, the quality of the plans and their implementation is variable, and needs to be improved. Currently, the slow delivery of high quality water plans is a potential threat to achieving NWI outcomes on a state-wide and national scale. If the current rate of progress continues, the remaining scheduled plans will not commence until well after the 2009 NWI commitment (Hamstead et al., 2008). Immediate acceleration of the development and commencement of water plans is required to allow water users to realise the full benefit of NWI planning reforms.

Continued effort is required to ensure that the best available knowledge and information is available to underpin plans. The presentation of 'best available' information in the plans is often focused on the physical condition with limited, or no description of the ecological and socio-economic condition of the water resource. There is significant room for improvement in identifying, quantifying and incorporating environmental outcomes in water plans; and there is still a long way to go to build the knowledge and capacity needed to jointly manage surface water and groundwater. Further work is also required to mainstream policies and practices which account for and manage changes in land use activities (such as large scale forestry) that intercept significant amounts of surface water and groundwater (Hamstead et al., 2008).

Addressing overallocation¹⁸ and overuse¹⁹ underpins the success of many of the NWI commitments and is a critical precursor to achieving a more sustainable water management

¹⁸ Overallocation exists where the total volume of water able to be extracted by entitlement holders exceeds the environmentally sustainable level of extraction.

regime in Australia. Though policies to address overallocation and overuse have largely been incorporated into water planning, the lack of specific results remains a major concern. There remain divergent interpretations across jurisdictions of the concepts of overallocation and overuse, an issue which is delaying and undermining current responses (Hamstead et al., 2008). Agreement on these key concepts is critical to identifying the occurrence of overallocated or overused systems and to developing consistent pathways to uniformly address overallocation and overuse. Until then, it is difficult to see how jurisdictions are making material progress in reducing overallocation and overuse and evidence suggests water systems are continuing to degrade (CSIRO, 2008). Activities to address overallocation and overuse need to be accelerated and should have clear, testable outcomes and timelines to achieve them.

Determining environmentally sustainable limits of extraction²⁰ from water systems is a necessary component of addressing overallocation and overuse. However, a shared national understanding of environmentally sustainable levels of extraction and how this would be applied in practice is lacking. The current determination of sustainable diversion limits is generally informed by poor quality historical information and the methods used need to improve. Climate change is anticipated to exacerbate the shortfall of water available in many catchments, highlighting the importance of developing a more effective risk-based approach to water planning and the determination of sustainable limits of extraction across the country (CSIRO, 2008). The CSIRO Sustainable Yield Project provides a much better basis for informing the development of new sustainable diversion limits for surface and groundwater systems but more work is required to incorporate this improved science into planning.

¹⁹ Overuse exists where the total volume of water **actually** extracted by entitlement holders exceeds the environmentally sustainable level of extraction.

²⁰ An environmentally sustainable level of extraction is deemed to be the level of water extraction which, if exceeded would compromise key environmental assets, or ecosystem functions.

5.2 Water markets and trading

5.2.1 Progress to date

Water markets have continued to mature under the NWI as a result of legislative and administrative developments that now allow trade to occur in every jurisdiction (Lawlab, 2009). The Commission's report *The Economic and Social Impacts of Water Trading* (Frontier Economics et al., 2007) finds that reform has contributed to a significant expansion in water trading activity, and water was traded in every jurisdiction in Australia during 2007 with the exception of the Northern Territory. The majority of this trading activity occurs in the Murray-Darling Basin, where New South Wales, Victoria and South Australia have put in place arrangements to allow for interstate trade in water entitlements and allocations.

States have removed, or at least modified, rules restricting trade. New legislation has come into effect in New South Wales and Victoria (Lawlab, 2009). Private irrigation entities in New South Wales and South Australia now allow for permanent trade out of their areas up to the 4 percent threshold limit. Victoria has lifted its 2 percent limit to 4 percent. As outlined in Chapter 4, the *Water Act 2007* also has important implications for Australia's water markets, giving new powers to the Australian Competition and Consumer Commission (ACCC) to advise on water market, water trade and water charge rules. This new role for the ACCC presents a significant opportunity for further water market reform in the Murray-Darling Basin as for the first time, there will be one independent authority monitoring compliance with and enforcing water market rules and water charge rules (ACCC 2008).

Significant effort has been made in each jurisdiction to implement statutory water registers to handle the registration and trade of water access entitlements consistent with the NWI. However, jurisdictions have adopted different approaches in developing water registers which has perpetuated different specifications and terminology for water products and water dealings between jurisdictions. Registers in each jurisdiction also differ in terms of data recorded (e.g. encumbrances, use provisions) and in levels of public accessibility (PWC,

2008). In addition to government reforms, there have also been industry-led developments, such as the growth of the Australian Water Brokers Association and the increasingly sophisticated products and services offered by water market intermediaries (e.g. Waterfind *Water Index*). Statistical information published in the Commission's inaugural *Australian Water Markets Report 2007-08* indicates that over the last decade, the market for water entitlements has grown to AUD\$1.7 billion per annum, with over 32,200 trades occurring in 2007-08 – representing the transfer of 2500 gigalitres of water. Water trade, within and between states, is proving very effective in reallocating scarce water supplies. The market has given irrigators greater flexibility in managing short term events such as drought, as evidenced by a temporary reallocation of 1600 gigalitres of water – mainly from areas of annual cropping to permanent plantations of vines and fruit trees. Strategic adjustment to longer term trends such as climate change and changing demographics has also been observed, with the permanent reallocation of 900 gigalitres (NWC *Australian Water Markets Report*, 2008).

The market has facilitated price 'discovery', which has given investors and planners greater certainty about the value of water and efficient levels of investment in securing access. The market has also allowed governments to purchase water for environmental purposes at relatively low cost, while providing fair compensation to irrigators wishing to exit the industry (NWC *Australian Water Markets Report*, 2008).

The purchase of water entitlements from willing sellers has been a feature of governments' plans to increase environmental water in the Murray-Darling Basin. The Commonwealth *Water for the Future* plan includes a \$3.1 billion commitment over 10 years to buy water for environmental purposes through the *Restoring the Balance in the Murray-Darling Basin Program*. The first \$50 million tender package was announced in February 2008 and approximately 35 gigalitres of water entitlements were purchased from seven of the Murray-Darling Basin's 18 catchments. Secondly, *Riverbank* (managed by the New South Wales

Government) acquired approximately 118 gigalitres of entitlement over the 2007-08 water year. Finally, the MDBC's *The Living Murray Pilot Environmental Water Purchase Project* also secured 20 gigalitres of water entitlement through a tender system in 2007-08. Across the three programs a total of 69 gigalitres of water entitlements were purchased in 2007-08, representing about eight percent of the total water entitlement trade (NWC *Australian Water Markets Report*, 2008).

NWI reforms have contributed to an expansion of the scope of water trade. Urban water supply authorities in the Australian Capital Territory and South Australia have entered into the rural sector water market to secure additional water for urban supply²¹. In addition, Perth's water supplier has been able to secure additional supplies through a bilateral transfer of entitlement from Harvey Water – an irrigation company²². The Queensland Government has introduced a new market structure and new supply arrangements in South East Queensland, on the back of investment in a water grid connecting water sources and supply authorities. The new structure makes provision for water trade between bulk suppliers and large water users (QWC, 2008).

5.2.2 Ongoing implementation issues and priorities

Water markets have developed and progressed under the NWI, however the growth of trading within and between states in recent years has brought into sharp focus the need for greater market efficiency, as well as the need to remove remaining barriers to trade. Market efficiency can be improved by better pricing and information disclosure to promote transparency, improving market confidence in water intermediaries, streamlining transaction processes, and reducing approval times for water trades. Significant delays have been reported during recent years in the Murray-Darling Basin due to the high volume of

²¹ Government sources suggest the SA Government may have to buy 65 gigalitres to meet Adelaide's drinking water needs in 2008-09.

²² In 2006, Harvey Water and the Water Corporation negotiated a trade to transfer 17 gigalitres of allocation (Water Corporation Submission to the Economic Regulation Authority's Inquiry on Harvey Water Bulk Water Pricing, 13 November 2006).

applications to trade and capacity constraints in approval authorities. Substantial effort is being put into inter-jurisdictional processes to reduce transaction costs and transaction processing times (CWGCCW, 2008). Much of this work is focussed on the development of a national water market system, through which significant improvements in the operation of the market could be achieved. It is hoped that such a system would go beyond NWI commitments for the registration of entitlements, to include allocations, administer transactions, and provide market information – supporting timely and low-cost water transfers across irrigation area boundaries and state borders. To continue to realise the benefits of water markets, the introduction of the national water market system should be a priority area for coordinated action to ensure market function does not continue to be impacted by these problems (CWGCCW, 2008).

While water trading is being shown to provide numerous benefits to individuals, communities, the environment and the economy, there remain a range of community and industry concerns associated with trading water and governments' participation in water markets (Frontier et al., 2007). Better monitoring and communication of the impact of water trade on all stakeholders across regional economies and communities is required to ensure support for this critical area of reform. Under the NWI, the Commission is required to monitor the impacts of trade and is currently undertaking work in this area, but owing to a lack of information progress to date has been slow²³.

Concerns have been expressed that the NWI 4 percent interim threshold limit²⁴ on trade out of irrigation areas may limit the scope for environmental or other water purchases – either by preventing additional environmental purchases or because environmental purchases may crowd out other inter-regional trades (ACCC, 2008). Statistical information published in the

²³ The inaugural report from the Commission project to develop a framework to monitor the impacts of trade in the southern Murray-Darling Basin is expected in September 2009.

²⁴ Under the NWI, the annual threshold limit of 4 percent on entitlement trade is common to all jurisdictions (clause 60 (iv)(b) and clause 63 (ii)).

Commission's *Australian Water Markets Report 2007-08* confirm these concerns, suggesting that if the amount of water already targeted for environmental purposes is to be recovered, the 4 percent limit will need to be revised. The 4 percent limit was implemented under the NWI to manage the rate of structural adjustment, but since its establishment the pressures of climate change and buyback for the environment have changed the context of adjustment in irrigation communities. The 4 percent limit is now being reached in regions in several Basin states with a wide range of undesirable consequences, including impeding the pathways for returning over-allocated water systems to sustainable levels of extraction; unfairly and arbitrarily penalising willing sellers of irrigation entitlements; distorting patterns of interstate water trade; inhibiting desirable structural change; and complicating interstate collaboration in other areas of water reform.

In 2008 COAG stated an 'ambition' to increase the interim threshold to 6 percent in 2009, while further consideration is given to the continuation of the limit (CWGCCW, 2008). While the possibility of at least some relaxation of the limit is positive, simply increasing the threshold does not deal with the fundamental problems of such a limit. Given the constraint that the limit is placing on water recovery for the environment, and the barrier and uncertainty the limit can create for irrigators who are considering selling, there is a strong case for removing it altogether. If water trade is to act as a mechanism for autonomous adjustment and the flexible allocation of water to its most productive use, remaining distortions and trade barriers such as this must be removed. As argued in Chapter 6, a more direct approach to managing structural adjustment is now required.

5.3 Best practice water pricing

5.3.1 Progress to date

States and territories have implemented the majority of NWI commitments relating to best practice pricing. Working collaboratively with the Commission, draft national principles have

been developed to meet the NWI commitment to implement consistent approaches to charging across the country. The principles are for recovering capital expenditure; setting urban water tariffs; recovering the costs of water planning and management; and setting prices for recycled water and stormwater for reuse. After a number of false starts, it is now expected that the draft principles will be considered by COAG in 2009. If endorsed, the principles will form the basis on which water charges are set within jurisdictions.

In the meantime, all states have implemented consumption-based pricing in both rural and urban systems as required. Where consumption-based pricing has not been adopted, as is the case for some retail urban water providers in Tasmania, a case has been made that the introduction of consumption-based pricing was not at that time cost-effective. States and territories have largely met their ongoing NWI commitment to move towards upper-bound pricing²⁵ for metropolitan water storage and delivery. However, the level of cost recovery for water storage and delivery in rural and regional areas has been mixed across states. In some rural schemes, full-cost recovery is never likely to be achieved, as customers simply do not have the capacity to absorb the price increases that would be required to achieve it.

Water planning and management activities undertaken by states and territories vary enormously in scope, objectives and focus. States have achieved varying degrees of progress in terms of cost recovery for water planning and management, ranging from relatively well-developed cost recovery arrangements in New South Wales, through suspended arrangements in Queensland, to less developed policy positions in South Australia and Western Australia. All states have demonstrated that they have processes in place to undertake assessments of economic viability and ecological sustainability of investment in new or refurbished infrastructure prior to the investment occurring, as required under the NWI.

²⁵ Upper bound pricing is the level at which, to avoid monopoly rents, a water business should not recover more than the operational, maintenance and administrative costs, externalities, taxes or tax equivalent regimes (TERs), provision for the cost of asset consumption and cost of capital, the latter being calculated using a weighted average cost of capital (WACC).

Independent annual performance reports from urban water utilities and rural water service providers benchmark pricing and service quality, and are a key commitment under the NWI. The first national performance monitoring report of major and non-major urban water utilities was released in May 2007, meeting the NWI commitment to independent, public annual reports on their performance (NWC, 2007b). The second such report was released in April 2008 and, for the first time, includes comparative indicators that will enable comparison between different utilities (NWC, 2008b). The inaugural performance report for rural water service providers was also released in April 2008 (NWC, 2008c). These improved reporting arrangements are bringing greater transparency to charging practices, and helping foster competitive neutrality.

5.3.2 Ongoing implementation issues and priorities

While reasonable steps have been taken to implement NWI pricing actions, the delay in obtaining high level endorsement of pricing principles has slowed progress in achieving consistency in the way water charges are set across Australia. Consistency is desirable in a number of areas of charging, and for a number of reasons, including providing consistent pricing signals where water is traded in order to avoid economic distortions and to improve the competitive neutrality of state water regimes; and to achieve consistent regulatory principles and reduce the risk of regulatory error.

Pricing policies for recycled water and stormwater are lagging and need to be improved as a matter of priority. Consistent with NWI commitments, pricing policies for recycled water and stormwater should be congruent with pricing policies for drinking water so as to stimulate efficient water use regardless of the source. Recycled water and stormwater re-use schemes need to be considered in a system-wide context and prices should reflect externalities and avoided or deferred costs.

In addition, there exist a range of broader reforms not directly specified under the NWI which would deliver improved pricing outcomes. Reviewing institutional arrangements in the urban water sector could provide greater opportunity for private sector investment and innovation and third party access. Institutional reform in the water sector has not kept pace with other sectors such as telecommunications, electricity, gas and ports. Regulatory reforms, including price-setting, allocation and tradability of bulk water resource access rights and third-party access to natural monopoly²⁶ infrastructure, have the potential to promote more efficient resource use and greater choice in water services and water products. Similarly, where the lack of financial and technical resources available to small (typically local government) water providers is compromising the quality of service provision, this problem could be addressed through structural reform.

Efficient and sustainable pricing arrangements will become increasingly important in the face of a significant wave of government investment in urban water supply augmentation and some rural investments. Water prices convey important signals to customers and signal the viability of investment in new sources of supply. Getting water charging right is therefore critical to ensuring that water is used wisely and that new sources of water supply are made available in a timely fashion.

5.4 Integrated management of water for environmental outcomes

5.4.1 Progress to date

All NWI parties, including the Commonwealth, have legislative arrangements in place to manage environmental water (Lawlab, 2009). In New South Wales, these arrangements have been developed in association with broader changes in institutional arrangements. In some

²⁶ A natural monopoly exists where a single provider can deliver a product or service at a lower cost than two or more providers could. Natural monopolies typically exist in utility industries where there is a high proportion of fixed costs.

other states existing institutions have been strengthened while new authorities have also been formed, such as the *River Murray Environmental Manager* in South Australia (SKM, 2009). The arrangements vary depending on the broader nature of the water management regime and generally recognise key differences between regulated and unregulated water systems, the water system scale, and level of risk to the resource. In some states, progress has been made in specifying environmental outcomes and tying management practices to achieving these outcomes. For example, Victoria's state-wide river health strategy and regional river health strategies identify environmental assets and outcomes and propose actions to meet specified outcomes (DSE, 2008).

All NWI parties, including the Commonwealth, have established environmental water managers. The *Water Act 2007* establishes a Commonwealth Environmental Water Holder (CEWH) with statutory responsibility to procure and manage water for the purpose of protecting or restoring the environmental assets of the Murray-Darling Basin and other areas where the Commonwealth holds water. The CEWH will manage the water entitlements that the Commonwealth is currently acquiring through its water entitlement purchasing and irrigation infrastructure renewal programs. Under this arrangement, environmental water is to be managed in accordance with an environmental watering plan agreed as part of the Basin Plan to ensure the most effective use is made of available environmental water and that obligations under the *Water Act 2007* are met²⁷.

A range of water recovery initiatives are being implemented, including purchases of consumptive water entitlements from willing sellers and through the funding of irrigation infrastructure projects that result in improved irrigation system efficiencies (water savings). Clause 79(ii) of the NWI provides a series of principles for determining the most effective and efficient mix of water recovery measures. The Murray-Darling Basin has been a major

²⁷ For further detail, see the *Commonwealth Environmental Water Holder 2008-09 Business Plan* at <http://www.environment.gov.au/water/publications/action/cewh-business-plan.html>

focus of water recovery measures to date. A number of water recovery projects have been developed under The Living Murray Initiative. The Living Murray Initiative was established in 2002 to help improve the health of the River Murray. In 2004, the Murray-Darling Basin Ministerial Council committed \$500 million (\$200 million from the Commonwealth government) over five years to recover 500 gigalitres of water for environmental use at six icon sites. A report on progress with environmental water recovery in the Murray-Darling Basin released by COAG in October 2008 (COAG 2008) showed that the Commonwealth and Murray-Darling Basin jurisdictions collectively recovered water entitlements for an average of 177 GL per annum over a four-year period to 2008, at an average cost of nearly \$295m per annum (or \$1,180m over the four years). The Initiative currently has three projects listed on the Eligible Measures Register that are focused on purchasing water on the market. These projects seek to recover up to a total of 195 gigalitres of water with budgets totalling \$331 million. Jurisdictions have indicated that these projects are essential if the Living Murray Initiative is to reach its volumetric and financial targets (ACG, 2009).

At a state level, New South Wales is implementing the RiverBank program, Wetlands Recovery project, and Pipeline NSW (water efficiency investments) and the Cap and Pipe the Bores program in the Great Artesian Basin. Victoria has established the Environmental Water Reserve and has committed to water recovery programs to provide additional water for 16 stressed rivers. Outside the Murray-Darling Basin, Western Australia has a number of formal and informal practices in place to recover water, including negotiated reductions in consumptive use (WA NWI Implementation Update, 2008).

Water resource legislation in each jurisdiction requires planning processes to address the use of water for environmental purposes (Lawlab, 2009). However, specification and security of non-entitlement environmental water varies across jurisdictions because it is determined through the planning process and is therefore dependent upon provisions within individual water plans and the effectiveness of their on-ground implementation. The drought conditions

of the past six years have highlighted inadequacies in plans to secure water recovered or provided for the environment. The Commission report *Strengthening Environmental Water Governance Arrangements* (NWC, 2007b) provides several examples of environmental water in some water plans either being delayed or cancelled. For instance, high reliability environmental entitlements in Victoria's Yarra River, defined as part of the Central Region Sustainable Water Strategy, have been deferred since April 2007 as part of contingency measures during the extreme dry conditions. The reason for the qualification is to ensure supply for essential human needs in Melbourne.

The Commission's Waterlines paper *Water Allocation Planning in Australia – Current Practices and Lessons Learned* found a general deficiency in monitoring, evaluation and reporting on environmental watering plan implementation and outcomes across all jurisdictions (Hamstead et al., 2008). High quality scientific monitoring and evaluation of environmental water allocation and performance is generally lacking, in part due to the complexity involved and the substantial resourcing requirements. With the exception of Queensland, water plans do not include detailed monitoring processes that have been designed to determine if the plans are effective in achieving their objectives. The monitoring processes described, or referenced, in water allocation plans are generally over-simplified with limited explanation of the specific monitoring arrangements (e.g. identification of performance indicators and when and how often they are to be measured).

The Commission developed the *Framework for River and Wetland Health* for the *Australian Water Resources 2005* assessment to meet commitments required under the NWI (NWC, 2006). The framework has applications for water planning and management and for informing a range of programs aimed at recovering water for the environment. The framework should also act to enhance alignment of existing monitoring activities by acting as a 'feedback' mechanism to identify possible correlations, redundancies or gaps in monitoring efforts. The Commission has commenced trials of the framework in Queensland, which are due to be

completed in 2010. While there has been continued progress towards a national framework to identify High Conservation Value Aquatic Ecosystems (HCVAEs) and all NWI parties are members of the Natural Resource Management Ministerial Council's Aquatic Ecosystem Task Group, agreement on the HCVAE framework and criteria has yet to be reached.

5.4.2 Ongoing implementation issues and priorities

While progress has been made in establishing the institutional arrangements, the NWI outcomes for integrated management of environmental water are not yet being achieved and there is significant community concern about the lack of tangible results on the ground²⁸. The prolonged drought and potential impacts of climate change across southern Australia have led to a quantum leap in the magnitude of the challenges facing environmental water managers and the pace of reform has generally been too slow to ensure the adequate protection of environmental assets. Achieving improvements is made more difficult by the inadequate specification of the desired environmental outcomes. This is primarily due to the shortcomings in water planning processes; in particular, the transparency of trade-offs between environmental and consumptive water uses and the adequacy of the science underpinning water plans. The inability to provide adequate specification of desired outcomes leads to difficulty in monitoring and consequent lower levels of accountability that undermine adaptive management processes.

Increased rigour is required in specifying environmental outcomes and the associated water requirements. There needs to be a sustained effort to draw from the best available science concerning environmental assets and ecosystem functions, and their associated water requirements to complement improvements to the knowledge that underpins management practices. In addition, more systematic monitoring and measurement of river health outcomes is required to provide a firm basis for adaptive management decision-making at a state and national level. More specific arrangements to manage for high conservation values need to be

²⁸ The national debate about the decline of the Coorong and Lower Lakes in South Australia is the most obvious example.

in place nationally, including ‘securing’ environmental water outcomes once clearly defined. Securing water for the environment involves moving from science-based recommendations to developing statutory instruments that provide for environmental outcomes²⁹.

While institutional arrangements for environmental management have been implemented, the complex interaction of multiple entities in some states means that it can be difficult to identify who is responsible for which part of the environmental outcome specified in a water plan. The Commission report *Strengthening Environmental Water Governance* (NWC, 2007b) considered how environmental water governance arrangements could be improved in light of the 2007 *Biennial Assessment* findings (NWC, 2007a). The paper found that clearer accountability of these entities to deliver environmental outcomes is required along with good governance, clarity of roles, and close practical coordination between entities.

A priority for improving integrated management of water for the environment is ensuring environmental managers are equipped with the necessary statutory authority and that the community understands, accepts, and has confidence in this authority. In addition it will be necessary to ensure that environmental managers have the appropriate technical skills and financial resources. The Commission report *Strengthening Environmental Water Governance* (NWC, 2007) finds that all jurisdictions have insufficient financial and human resources to achieve efficient and effective delivery of environmental water objectives and outcomes and that this shortfall is significant.

²⁹ The two main instruments in use are environmental entitlements (water access entitlement that is committed for environmental purposes) and rules-based environmental water (generally provided through limits and rules on extractions of surface and groundwater for consumptive use).

5.5 Water resource accounting

5.5.1 Progress to date

Some progress has been made towards the delivery of water accounting objectives under the NWI. Benchmarking of states' water accounting practices was completed in 2006, in accordance with NWI requirements (SKM, 2006). This study found that, while showing signs of improving, water accounting in Australia was at an immature phase and being developed in an ad hoc fashion. NRM Ministers agreed to develop a National Water Accounting Model based on a disciplinary approach similar to financial accounting. The model goes beyond the actions strictly required by the NWI, and is an approach that is likely to achieve a nationally-consistent result as envisaged in the NWI.

The work on developing a national water accounting system, expected to be completed in 2010, includes the development of national standards for water market accounting, resource accounting and environmental water accounting as well as standards for water accounting information systems. As of early 2009, a conceptual framework to provide an ongoing reference for the development and maintenance of standards was nearing completion. In addition, six pilot projects have been established in Queensland (Pioneer Valley Catchment), New South Wales (Regulated Murrumbidgee Valley), Victoria (Goulburn-Broken), South Australia (Lower River Murray), Western Australia (Carabooda and Lower Gascoyne River) and the Murray-Darling Basin (River Murray Shared Water Resources). These pilot projects will produce demonstration water accounts, and inform further development of the national water accounting standards.

As found in the Commission report *The need for improved water data and water data sharing* (SKM, 2008c) work on sharing information is proceeding steadily through jurisdictional cooperation at the national level. The endorsement by NRM Ministers of the principle of open and efficient water data sharing is a positive step in establishing a shared vision for water data

sharing (SKM, 2008c). The *Water Act 2007* gives the Bureau of Meteorology responsibility for compiling and maintaining water accounts for Australia and for issuing national water information standards. The Bureau of Meteorology is taking the lead in determining nationally agreed definitions and standards for data to be collected in the Australian Water Resources Information System.

A prerequisite for accurate water accounting is the effective roll-out of meters of an appropriate standard. Until recently, there has been no Australian standard for water meters or ancillary data collection systems and the extent of metering is mixed across jurisdictions. The national Metering Expert Group (consisting of officials from all NWI parties) has made good progress on the development of standards for meters used in measurement with the National Measurement Institute (NMI). With support from the Commission the NMI has now published pattern approval standards for water meters.

Based on this work states are continuing to draft their jurisdictional implementation plans outlining how the adoption of metering standards and roll-out of meters will take place in each jurisdiction. To assist states to prepare their implementation plans, the Australian Government has invested in an accelerated stocktake of meters and meter installations across Australia. The stocktake report was completed in May 2008 and estimates the cost of installing and replacing meters across Australia to be in the order of \$650 million (SKM, 2008a).

5.5.2 Ongoing implementation issues and priorities

Standards for improved accounting for water use and availability for application in Australia are being developed, and detailed data is being collected at many levels. However, there are continuing constraints to the overall effectiveness of water accounting, including serious compliance issues. Compliance and enforcement arrangements across the water sector remain mixed at best. As noted by Connell and Dovers (2006, p. 20) the capacity to implement and

enforce an NWI consistent water management regime “is well beyond the current institutional capacity of most catchment bodies and level of available hydrological knowledge”. Non-compliance varies between states but is an issue for groundwater, private pumpers and domestic and stock supplies (Watson, 2007). It is noted here that while standards for environmental water accounting are being addressed through the National Water Accounting Development project, very limited progress has been made towards states’ NWI commitment to develop environmental water registers. A refocusing of effort in this area is required, particularly given the importance of registers in underpinning community confidence in environmental water recovery investments.

Making new water accounting and measurement standards operational presents a significant challenge to governments and water users, but represents a key area of reform where acceleration would result in significant benefits to water management and use. All governments will need to remain closely engaged in the development of the new standards, and the on-ground implementation of these if the NWI outcomes are to be achieved.

5.6 Urban water reform

5.6.1 Progress to date

On the whole NWI parties have completed the NWI actions concerning urban reforms. All States have now enacted legislation corresponding to the Commonwealth *Water Efficiency Labelling and Standards Act 2005* to ensure that the scheme applies consistently across Australia and to confer regulatory powers on the Australian Government. The implementation of cost-effective management responses to supply and discharge system losses (including leakage, excess pressure, overflows and other maintenance needs) is an ongoing action and is largely being implemented by the urban water industry. With respect to supply augmentation actions, the development of *National Guidelines for Recycling* (NWC, 2008b) has provided

guidance to jurisdictions on how recycling of stormwater, grey water, groundwater and wastewater can be safely and sustainably achieved.

Progress has also been made towards enhancing innovation and capacity building for the creation of water sensitive cities, with a focus on integrated urban water supply planning and management, water sensitive urban design, and water sensitive urban developments. For example, best practice guidelines for the installation of household stormwater and grey water recycling systems and national guidelines for evaluating water sensitive urban design options have been released (NWC, 2008c). Further, a review of the institutional and regulatory arrangements in urban water has commenced in order to facilitate the adoption of integrated urban water management in Australian cities as required under NWI.

5.6.2 Ongoing implementation issues and priorities

While these actions are worthwhile, and are being implemented by governments in such a way as to address some of the broader urban issues, they have been overshadowed by the scale of water challenges now facing Australia's major cities. The context of urban water management has changed significantly since the NWI was signed, particularly in relation to the greater awareness that now exists of the vulnerability of urban supply systems to climate variability. Severe droughts affecting most Australian cities have brought the issue of urban water to the top of the policy agenda (Quiggin, 2006). However, the NWI outcomes for urban water reform still hold, including to provide healthy, safe and reliable water supplies, increase water use efficiency, encourage innovation in water supply sourcing, treatment, storage and discharge, and to achieve improved pricing. Despite progress in the urban water sector since the 1994 COAG water reforms, structural reform in the sector has generally not kept pace with that in similar sectors such as gas, electricity or transport (IPART, 2008). In some states, responsibility for the increasingly sophisticated tasks of urban water delivery remains with small and poorly resourced local government authorities.

Protracted drought conditions experienced across much of the country has challenged urban water management and led to severe and protracted water restrictions, both in major cities and regional centres. Urban water shortages in the current drought and the rush to invest in new urban water infrastructure are evidence that supply planning has not delivered the supply security expected by the community. In many areas of Australia the fundamental NWI outcome of reliable urban water supplies has not been achieved.

States are, however, making significant investment in less rainfall dependent sources of supply to increase water supply security. While less-rainfall-dependent sources of water supply typically come at a higher cost, the value to consumers of water supply security needs to be taken into account. Further consideration of environmental externalities and avoided costs when water is derived from less rainfall dependent sources of supply substitutes water from traditional sources of supply is also required. Further effort is required to ensure that pricing and institutional arrangements do not act to constrain less rainfall-dependent water sources from being made available.

A key challenge facing urban water managers is to meet demand for water in the face of uncertainty while minimising costs to end users and the environment. An adaptive approach to meeting water needs is a key means by which to avoid or defer costs until necessary – for example, investing in drought response measures only as and when required, and making appropriate use of short term measures such as drought restrictions.

In addition to investing to address scarcity and reliability, there is also a need to build resilience for times when water is abundant, including the ability to cope with flooding at a localised and regional scale. Taken together, these needs suggest further action is required to build climate change resilience into Australia's urban centres. An important contributor to this objective is to accelerate the roll-out of water sensitive urban design attributes in new developments and to retro-fit existing schemes as opportunities arise.

Many states are implementing a wide range of additional measures relating to urban water reform that go well beyond the currently limited scope of the urban water reform actions in the NWI. For example, a number of states have commissioned reviews of the institutional arrangements for the urban water sector including reviewing the scope for greater use of competition though further work needs to be done in this area to better understand potential costs and benefits of these arrangements. These developments reinforce the need to continue to investigate ways to better achieve urban water outcomes and to improve urban water supply security across Australia.

5.7 Summary

The implementation of water reform is delivering real improvements in the management, use and understanding of water. Progress has been and continues to be made across a broad range of areas of water reform. Achievements include improved water planning practices in all jurisdictions and substantial completion of water access entitlement and planning frameworks in priority areas. In addition, the introduction of legislative and administrative arrangements to facilitate trade in water entitlements has been very effective in managing the allocation of water during protracted drought. As NWI reforms are implemented they are contributing to the adaptive capacity needed to meet Australia's water challenges and respond to a changing climate. Knowledge of Australia's water resources has never been better, and institutional change has allowed for more accurate, transparent and responsive water management.

Notwithstanding the progress of water reforms described above, there are still significant areas of reform where progress lags, and a number of NWI timelines have slipped. In particular, overallocation of water resources continues to be a central national challenge and the environmental health of many water systems is under stress. Further, despite the evident benefits of water markets, concern about the rate of change facing irrigation communities

means water trade, addressing overallocation, and adjustment is being constrained by water market rules and other distortions.

These are not small issues; they are fundamental elements of the reform agenda. A lack of progress in these crucial areas undermines the achievements of the NWI and in doing so, Australia's response to its current and emerging water management challenges. A focus on the minutia of the reform agenda, at the expense of challenges such as overallocation and structural adjustment, suggests that governments have lost sight of key objectives and outcomes. The following chapter examines the broader process of reform to identify why progress in these areas is lagging and to identify a way forward on overcoming these major impediments to achieving a secure water future.

Chapter 6 Securing Australia's water future: addressing overallocation and adjustment

The analysis presented in Chapter 5 indicates that significant progress has been and continues to be made across a broad range of areas, which is seeing real improvements in the management, use and understanding of water in Australia. Notwithstanding this progress, governments have not yet come to terms with the issues of overallocation and adjustment. Governments must deal with overallocation and facilitate and expedite adjustment, or risk the collapse of water dependent ecosystems and irrigated agriculture. At present, a lack of progress in these interrelated areas of overallocation and adjustment is seriously undermining the ability of governments to achieve a sustainable platform for ongoing water management and use under the NWI.

This chapter considers the broader process of reform to identify why progress in these critical areas is lagging. It is argued that dealing with the fundamental issues of overallocation and adjustment should be the immediate priority of governments, because until addressed, water users and managers will lack the certainty to make the decisions required to balance competing demands for water, and decline of water-dependent ecosystems will continue. Maintaining an ad hoc approach to these issues will limit the capacity of the irrigation sector to deal with future reductions in water availability and impede efforts to return surface and groundwater systems to within sustainable limits. Tackling these problems requires significant change in water allocation and use, as well as in governments' approaches to these issues. Water will have to be reallocated away from irrigation to the environment, and increasingly scarce water will almost inevitably need to be reallocated between irrigators through trade. It is critical that governments appreciate that the design and implementation of water policy and programs, such the 4 percent limit on trade and the Commonwealth buyback and infrastructure renewal programs, can significantly influence the rate of change and cost of the adjustment process.

Accelerating reforms to address overallocation more quickly and to facilitate and expedite adjustment can provide significant overall benefits to water dependent industries, communities and the environment. However, it is likely that the distribution of the benefits will not be uniform and some individuals and communities may suffer hardship. It is suggested therefore that much is to be gained from fostering an improved understanding of the nature and scale of this change through an enhanced communication strategy that clearly articulates the anticipated outcomes of governments' policy response. Governments will also need to improve the way they work together on reforms to better coordinate different aspects of water policy and to integrate water policy within other broader government policies, better engage stakeholders in water reform, and work to equip communities and industries to deal with change.

Hussey and Dovers argue that "the challenges inherent in water policy are not isolated to Australia and... it is useful to place our experiences in the context of international developments" (Hussey and Dovers, 2006, p. 141). As noted in Chapter 1, increasing water scarcity means a number of countries need to reallocate water to balance competing consumptive and environmental demands and are reforming institutions to achieve an equitable and efficient means of doing so (Bauer, 2004; Easter 2004). While the drivers of change vary between countries, insight gained through this analysis of the Australian reform experience, therefore, may be relevant to other countries.

6.1 Understanding the change ahead

Almost all major metropolitan centres face some form of water restrictions. In the case of a number of these areas (Adelaide, Melbourne, Canberra and to a lesser extent Perth) water restrictions could be alleviated by the transfer of modest amounts of water from the irrigation sector (Quiggin, 2006). In this context, water available for irrigation can be expected to

decline significantly, as a result of reallocation to the environment and to supplement urban supply, in addition to there being less total available water as a result of climate change (as described in Chapter 4). Present water allocation in Australia is environmentally unsustainable and at odds with both the current relative economic might of the sectors that compete for the resource and a realistic measure of future supply (Crase, 2007).

Against this background it is difficult to see how irrigated agriculture can persist in its current form in Australia, at least in the longer term (Crase, 2007). The reality for Australia's main agricultural areas is a significant reduction in water available for irrigation, and a significant reallocation of water between irrigators in the water market as a result of a combination of factors both within and outside the direct control of governments. However this situation seems to have been largely ignored in the implementation of current reforms and is arguably a contributing factor to the evident lack of urgency in tackling these outstanding problems, as well as the apparently blind continuation of investment in irrigation infrastructure.

There are important environmental and economic benefits from amending current water policies and programs to address overallocation and facilitate necessary adjustment. Reallocation from irrigators to the environment may avoid further environmental decline and potential irreversible losses, and result in the broader economic and community benefits of a sustainable balance, such as long term water quality. For farmers who are willing to sell their water entitlements, the availability of the option of selling for environmental use increases demand, raises the likely price received and therefore reduces the economic and personal costs associated with adjustment from irrigated to non-irrigated agriculture, or out of agriculture altogether (Quiggin, 2006). Reallocation between irrigators and from irrigators to urban suppliers allows for consolidation or new development, promotes allocative and dynamic efficiency, and allows these users to manage risk. Significantly, addressing overallocation allows the risk assignment framework outlined in the NWI to commence,

giving much more certainty to entitlement holders about who bears the risk of future changes in the consumptive pool.

However, change required to address overallocation will result in significant social and economic costs in regions. There are direct economic costs, with less water resulting in less production and in turn less profit, employment, investment and export value. There are also indirect economic costs on associated industries such as suppliers of irrigation inputs, and flow-on effects in regional economies. Buybacks are less directly helpful in managing the broader social impacts in irrigation dependent communities and businesses that are dependent on the irrigation sector. These broader social and community costs are compounded when individual farmers downsize or sell up, and vary according to the dependence of the regional economy on irrigated agriculture and the size of the transition.

So, the changes ahead are significant and can be expected to result in significant environmental and economic benefits, but also social and economic costs. It is because of these costs, accompanied by a wider decline in the competitive advantage of agriculture, that the irrigation lobby and regional communities will continue to exert political pressure to protect their constituents from the impacts of any reallocation of the resource (Crase 2007). These groups recognise that government policy can affect the cost and rate of adjustment, and the capacity of industry and communities to handle prevailing conditions. As is noted by the Productivity Commission in relation to the expected reduction in water availability, it is true that “the consequences for irrigators depend not only on the climate but, to a large extent, on water policy” (PC 2009, p.47). However, the NWI reforms have resulted in planning and market-based policy mechanisms which allow irrigators and communities to benefit from adjustment. For instance, the purchase of irrigation water for the environment increases the value of water entitlements and the capacity of farmers continuing in irrigation to borrow and invest (Quiggin, 2006).

The continued resistance from irrigators and communities to the implementation of policies and programs to deal with overallocation, and governments' continuing concession to their claims, only serves to reduce the chances of these groups coping with the inevitable transition to future conditions. Resisting efforts to remove remaining barriers to trade for example, reduces individual irrigators' ability to realise the value of their assets and to manage risk. And in the meantime, the slow implementation of these key elements of reform results in ever greater environmental damage.

The critical issue for governments is to recognise and articulate the scale of adjustment required and understand the extent to which the costs and benefits depend on the transition path promoted by government. This is essential to allow governments to decide on the right policy settings to facilitate an optimal transition to new conditions and for building community and industry awareness and support.

Promoting gradual adjustment could be achieved by the current program of progressive buyback, the continuation of district limits to entitlement trade, subsidising infrastructure, and continuing with other forms of industry assistance (such as exceptional circumstance payments). In economic and social terms, this could provide time for some communities to adjust to reduced water availability, but it might also create coordination issues and increase overall costs. In terms of the environmental health of water systems, it could be too little, too late. The significant scale and rate of change required to respond to the expected impacts of climate change may mean this is not a viable option. As noted by Crase (2007), the challenge remains for policy makers and politicians to recognise that in this instance, delaying policy change until the transaction costs of tolerating the status quo exceed the costs of change will almost certainly be too late.

More rapid adjustment could be achieved through accelerated buyback combined with complimentary investment to reconfigure or rationalise infrastructure and better policy

coordination to identify and remove countervailing policy measures such as drought assistance (outlined in more detail in section 6.3). Being clear about this approach would help governments address the current lack of certainty over future changes to water availability as a result of government decisions to address overallocation, which has been attributed to irrigators' non-participation in the market. In economic and social terms this approach could avoid higher future costs, though rapid change may necessitate structural adjustment or exit programs to respond directly to address adjustment issues. The NWI provides little guidance on adjustment programs other than a commitment to consider proposals on a case by case basis. These programs have, to date, been developed by governments only in an ad hoc fashion and generally without regard to other government policies such as responses to drought.

In terms of the environment, moving quickly would reduce the risk of irreversible damage or loss. Once overallocation has been addressed, and the environment placed on a more sustainable footing, the future choices for irrigators and urban suppliers would be much clearer, as would be the risks. Water entitlement holders would be better able to consider their options in light of economic and climatic pressures and trade water to balance competing demands.

It is argued here, therefore, that the case for more rapid adjustment is strong. However, as noted above, it is essential that governments recognise and articulate the scale of change ahead and the costs and benefits of different responses. This is critical so that governments can decide on the right policy settings to facilitate an optimal transition to new conditions and for building and maintaining community and industry support for government actions. The lack of progress in this most important part of the debate may go some way to answering Botterill's (2006, p. 29) question of "whether pervasive agrarianism constrains analysis of rural policy". Most effort appears to be targeted at putting and responding to the case for gradual adjustment, rather than engaging in a rational dialogue about the change required to

secure a sustainable future for agriculture and the environment and the private and public costs of slowing this change. As argued by Connell (2007, p. 217) “there needs to be a reasonably stable consensus about what we are trying to achieve... before a long term water reform program can be successfully implemented”.

6.2 Improving the way governments work together on national water reforms

Dealing with overallocation will depend not only on addressing the competing preferences of private sector interests, but also with competition among the Commonwealth and the states. In the Murray-Darling Basin, a weakness of the previous Murray-Darling Basin Commission was that it operated by consensus and therefore hard decisions were avoided. With the passage of the *Water Act 2007*, the opportunity clearly exists for greater collaboration between governments at different levels and between jurisdictions. However, it is an extraordinarily ambitious technical and administrative assumption on the part of the Commonwealth to expect it can establish and carry out the actions required for the efficient and equitable economic and social management of the Murray-Darling Basin within environmental constraints. There is a real risk that the ambition of technical planning, and overlaying institutions with different responsibilities, will continue to create conflict and contribute to the maintenance of the status quo. This risk is similarly identified by Watson (2007), who believes a Commonwealth takeover will not remove underlying conflicts between the states that have caused these difficulties of administration. Nor will disagreements between irrigators and environmentalists be removed. Instead, Watson argues “they will be sorted out in the party room of whatever Government is in power in Canberra”, leaving “no reason to believe that this will result in a better result than existing arrangements” (Watson, 2007, p.4). Despite this, a useful first step would be for governments to clearly specify the respective roles and responsibilities of the different levels of government in water management and water reform.

Outside of the Murray-Darling Basin, there is scope for collaborative work among the three levels of government to incorporate water sensitive urban design into Australia's cities and towns. Urban form has a profound effect on water demand, costs, infrastructure and capacity to deal with both floods and water scarcity. With the involvement of local government (largely absent to date) governments could seek to develop a vision of water sensitive cities in a dry continent; in the process identifying obstacles and solutions to assist implementation.

6.3 Need for better policy coordination

As noted above, a more rapid adjustment to address overallocation and competing demands for available water will require governments to coordinate policy objectives to manage the impact of countervailing policies. Within the water reform agenda, a raft of policies and programs with different sources of funding and overlapping budgetary intervals now exist, many poorly designed and coordinated. A striking example is provided in the Commonwealth Government's Water for the Future plan, a model of confusion in policy design with countervailing influences. Nevertheless, some elements of the plan are clearly consistent with an accelerated approach to dealing with overallocation and support a market based approach to balancing competing demands for water. These include the proposal to spend \$3.1 billion to buy back water entitlements and the proposal to spend \$450 million to improve the quality and usefulness of water information. As noted above, buying back entitlements will assist irrigators in the unviable or inefficient parts of the system to exit and help facilitate the requisite reallocation of water to the environment.

This is inconsistent, however, with the proposal to spend \$6 billion over 10 years investing in key rural water projects that save water by upgrading out-dated irrigation systems.

Government intervention on the scale envisaged threatens to generate substantial economic and administrative costs and it sends a confusing signal to the irrigation community. As noted by James Cox and Richard Warner of the Independent Pricing and Regulatory Tribunal of

NSW “irrigators are likely to make better investment decisions using their own money and based on market criteria than political or administration decision-makers who typically have little local knowledge and spend public money” (Cox and Warner, 2009, p.3).

Commonwealth investment in rural water infrastructure also raises doubts about its own adherence to good pricing policy. Under the NWI, Parties agreed to the adoption of cost-reflective pricing for water, aiming to unravel the historical problems and issues relating to water costs that were described in Chapter 2. However, while the Commonwealth proposal funds works that clearly benefits irrigators, these cost-reflective pricing rules are not being applied to works funded by the Commonwealth Government. Like all input subsidies, this part of the plan will distort on-farm decision-making and is inequitable to irrigators and infrastructure providers who have already acted in response to market incentives to save water (Watson, 2007). This part of the plan is clearly at odds with some of the broader water reform objectives such as cost recovery and using markets to balance competing demands (Cruse, 2007).

The prices that water suppliers charge irrigators need to fully reflect the costs of renewing these water delivery systems into the future where the irrigators wish to have these systems maintained. Otherwise, history will simply repeat itself, irrigators will receive a windfall gain, unviable irrigators will be encouraged to remain in the industry, the efficiency of the water market will be reduced, and adjustment will be slowed and its pattern distorted.

The tension in policy objectives in relation to water trade and adjustment, played out within the NWI, cuts across other government policies and programs, including drought assistance. Water markets are intended to achieve allocative and dynamic efficiency as irrigators respond to seasonal, market or other adjustment signals, and buy or sell water through the market. The signals received by irrigators may be distorted, however, by government measures such as

Exceptional Circumstances Relief Payments (ECRP)³⁰ or interest rate subsidies in drought affected areas, which may in turn slow down adjustment. As Botterill (2003) observed in relation to drought policy, tension between government policies with structural adjustment objectives and political pressures arising during periods of low water availability are likely to slow adjustment and the implementation of reform.

This view is supported by McColl and Young (2005), who showed that where rural adjustment measures have been implemented in the past, they have often been inappropriate and have actually hindered rather than helped adjustment. They found that:

- when adjustment is impeded, the most significant adverse impacts are often on the capacity of the most talented in a district or an industry to innovate;
- when assistance is given to some but not all producers, it becomes harder for the non-assisted to compete with the assisted for access to land, water and other production resources;
- current programs deliver benefits mainly to relatively advantaged groups in the community;
- drought assistance tends to support practices and actions that can worsen impacts on resource productivity; and
- when pressures for change are high, there is a risk that well-intentioned adjustment programs can be counter-productive and in the long term result in a reduction in community health and well being.

In terms of encouraging rural Australia to adopt self reliant approaches to managing for climate variability and maintaining and protecting the resource base, the objectives of water and drought policy are very similar. As described by Botterill (2003), since 1992 drought policy in Australia has been based on principles of self reliance and risk management,

³⁰ ECRP is a Commonwealth government drought relief payment (for further discussion of Commonwealth responses to drought, see Botterill 2003).

consistent with the neoliberal economic theory which has informed water policy over this period. However, across government policy, there has to date been little coordination between water and drought policy, nor between water and forests policy, or water and regional planning, or indeed transfer of the lessons learnt in one area of reform to another. To the extent that elements of each of these policies can impede structural adjustment and run counter to the requirements of long term sustainable natural resource management it would seem that much could be gained from greater coordination.

In developing a coordinated policy response, it is argued here that it is essential to:

- consider the objectives of each program and the extent to which they are aligned;
- develop the right instruments to achieve the objectives, and address countervailing instruments and incentives;
- coordinate government action across different policy instruments to reduce the transactions costs to irrigators in their decision making processes; and
- consider which public agencies are best placed to lead the development of a such an approach, and who is best placed to interact with irrigators.

A first step to improving coordination would be the development of national principles for the design of adjustment programs to guide governments' involvement in addressing adjustment issues in rural and regional areas. Such principles could assist to:

- clearly define the role of government and the role of water policy in the adjustment process;
- determine when/where additional adjustment assistance may be warranted (and when it is not);
- determine which adjustment assistance measures might be most appropriate; and
- determine how they can designed and implemented effectively and tailored to particular circumstances in particular regions.

National principles for the design of adjustment programs could usefully inform the development and use of an integrated and coordinated package of incentives to facilitate and expedite adjustment. Such a package, and individual elements, should be voluntary and should reflect the true costs of operating in specific areas and the full benefits of land and water use change, and in irrigation areas could include:

- incentive payments for asset rationalisation prior to irrigation system renewal to avoid unnecessary asset renewals;
- buyback of entitlements at market price³¹ to achieve clearly defined flow-related environmental objectives;
- expanding the use of salinity impact zones and providing credits for land use change away from irrigation; and
- other price or market based instruments for environmental outcomes (e.g. native vegetation, biodiversity, carbon sequestration) facilitated through changes to water use licences or for other verifiable land use changes.

Implementing and promoting such a package in a coordinated manner prior to, or in conjunction with, irrigation system renewal would deliver multiple benefits in the adjustment process – to landholders moving out of irrigation, remaining irrigation customers, and the environment. Importantly, most of the necessary instruments already exist or can be readily refined suggesting such an approach could achieve results quickly and effectively. The aim should be to facilitate the movement of some farmers out of irrigation while ensuring that those that remain are not left with an inefficient and unaffordable system. Urgent work is required to further develop and structure such packages and identify the best means of interacting with water users.

³¹ ABARE (2007) supports the use of open market purchases and (to a lesser extent) broad based auctions (tenders) to ensure cost-effectiveness, efficiency, and avoidance of strategic behaviour and information asymmetry in large-scale buyback programs.

6.4 Engaging with water users and equipping them for change

Stakeholder engagement has been generally poor in the implementation of the NWI.

As noted above, it is important that stakeholders are given a clearer articulation of governments' intentions with respect to addressing overallocation and managing adjustment. In order to maximise transparency and provide certainty for investment, governments need to engage in deliberate consultation strategies to ensure water users, communities and associated industry are better informed about likely reductions in water availability. Providing water users and communities with the timely access to the best available information on what the future of irrigation might look like and their subsequent land and water use options is an important role for government in enabling adjustment. In this regard it is regrettable that government-provided agricultural extension services have been in long term decline and have not been directed to address issues that are well suited to government involvement.

Similarly, governments should communicate, to the greatest extent possible, their intentions in relation to the amount of water sought and the areas where it is being targeted so as to provide greater certainty for investment and the environment. This may also allow governments to benefit from local knowledge and experience to identify more prudent infrastructure reconfiguration or refurbishment projects, signalling a more strategic and collaborative approach to transitioning to a future where less water is available for irrigation.

On the upside, through improved information, entitlement specification, planning and ability to trade, water reform has significantly increased the capacity of water users to respond to changing circumstances and equipped them to better manage future conditions and risk.

However, as outlined in chapter 5 and as discussed above, barriers and distortions to water trade still remain. These barriers and distortions reduce the efficacy with which water markets facilitate autonomous adjustment and removing these impediments will help achieve the NWI objective of dealing with change responsively and fairly.

6.5 Summary

The extent to which current water reforms can secure Australia's water future now largely rests upon the critical actions and outcomes concerning overallocation and adjustment. As identified in this chapter, full and timely implementation of agreed water reforms is critical. Failure to address the big ticket items of overallocation and adjustment jeopardises current water management objectives and undermines the ability of Australia's water management framework to respond to current and emerging challenges. To move forward from here, governments need to appreciate and communicate the scale of change required in water use in response to protracted drought and climate change. More must be done within and between governments to respond with decisive and coordinated policy to support more sustainable river systems and better equip communities to adjust. There is little evidence to suggest that these measures are being implemented in a coordinated and integrated fashion.

Water policy settings need to help facilitate significant reallocation of water as the total water available declines. The reallocation process would be accelerated by communicating clear targets for reallocation to the environment, coordinating buy back with appropriate reconfiguration and targeted adjustment assessment to help communities manage change. Policy settings also need to support efficient water markets as the best way to allocate remaining water between consumptive users and to provide signals for viable investment in water supply infrastructure. To improve governments' approach to dealing with adjustment issues, national principles and an integrated and coordinated package of incentives to facilitate and expedite adjustment are recommended.

By highlighting where the implementation and coordination of water reforms could be improved, utilising the above strategies, this analysis is intended to assist the implementation of the current reform agenda in Australia. In addition, given similar challenges in reallocating water for competing demands being faced abroad, this analysis is relevant to scholars and

policy makers concerned with more equitable and efficient water resource management in a variety of international settings.

Chapter 7 Conclusions

Australia is the driest inhabited continent in the world and experiences high variability in rainfall and surface runoff. In addition, this thesis comes at a time of unprecedented water scarcity across southern Australia, with rainfall deficiencies among the most severe on record in most of Victoria, southern New South Wales, southern South Australia and south-western Western Australia (BOM 2009). This reality underscores the importance of ensuring a secure, efficient and sustainable water supply – one of the most significant public policy issues facing Australia. This thesis has tackled the question of whether current water reforms can be expected to meet the challenges posed by scarce and variable water supply, particularly in the context of the intensification of these challenges due to climate change.

The thesis began by examining the ideas and objectives that have historically underpinned Australia's approach to water management. Past water management strategies have focussed on securing water supply, and resulting high levels of storage capacity have provided largely unrestricted urban supplies and significant agricultural wealth. The historical development and allocation of Australian water resources has resulted in a difficult policy landscape, leaving a legacy of institutions and infrastructure which are costly to maintain and resistant to change.

Consequently, a high proportion of both surface and groundwater management areas are now either fully or over-allocated, particularly in eastern Australia. There has been a significant and persistent decline in the health of these water systems and increasing concerns about the equity and efficiency of continued government investment in water supply infrastructure. In response, national water reforms have been developed with the goal of achieving a sustainable and efficient supply of water for competing uses. Projected decreases in rainfall and increases in temperature across much of Australia due to climate change, however, will intensify this challenge.

Building upon the historical factors shaping water policy in Australia, the thesis then focused its analysis on Australia's contemporary approach to water policy and management, as embodied in the NWI reforms. The current and emerging policy drivers impacting water management were isolated for detailed assessment and a critical evaluation of the implementation and impact of the NWI to date was provided, along with an outline of further action required in each of the major areas of NWI reform.

The analysis of the progress in reforms has been based on the author's experience with the *2007 Biennial Assessment*, and the *2008 Update Report*. The analysis has found that the policy prescriptions in the NWI are resulting in improvements in the understanding, management and use of water, and are appropriate for current and emerging water management challenges. However, the thesis identified that in order to achieve full and timely implementation of water reforms, a number of barriers to key elements of reform still need to be overcome.

The thesis argues that the interrelated issues of overallocation and adjustment need further critical attention, and that the adequate implementation of reforms dealing with these aspects of water reform is crucial to the successful implementation of the overall reform agenda. In short, immediate progress is required in these areas to achieve the broad objectives of the NWI. Failure to address the issues of overallocation and adjustment jeopardises current water management objectives and undermines the ability of Australia's water management framework to respond to current and emerging challenges.

This work extends the analysis in the *2007 Biennial Assessment* and *2008 Update Report* by considering the broader process of water reform to identify the barriers to addressing overallocation and adjustment and makes suggestions about the way forward in these key areas. The economic and social costs of adjusting to the reallocation of water required to address overallocation and allow market mechanisms to balance competing demands have

been found to be significant barriers to change. In addition, confusion in the design of some water policies and programs, and a lack of policy coordination, have also been found to be resulting in countervailing drivers and reducing the efficacy of reforms.

To address these problems, it has been argued that governments need to better appreciate and communicate the scale of change required in water use in response to protracted drought and climate change. More must be done within and between governments to respond with more decisive and coordinated policy to support more sustainable river systems and better equip communities to adjust. Water policy settings need to help facilitate significant reallocation of water as total water available declines. The reallocation process would be accelerated by communicating clear targets for reallocation to the environment, coordinating buy back with appropriate reconfiguration and targeted adjustment assistance to help communities manage change. Policy settings need also to support efficient water markets as the best way to allocate remaining water between consumptive users and provide signals for viable investment in infrastructure. To this end, this thesis has recommended principles to improve governments' approach to dealing with adjustment issues and has outlined an integrated and coordinated package of incentives to facilitate and expedite adjustment in irrigation areas.

Australia is at a crossroads in terms of its ability to cope with increasing water scarcity, and this work shows that the NWI is critical to meeting current and future water challenges. Although good progress in current reforms has been made, there are some fundamental areas which require greater work. The current water crisis does have an upside in that both the focus on water reform in Australia and the momentum to drive reform are at unprecedented levels. By highlighting where the implementation and coordination of water reforms could be improved, this work is contributing to the Commission's *2009 Biennial Assessment* and, it is hoped, the achievement of that which has so far eluded Australia: a secure water future.

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